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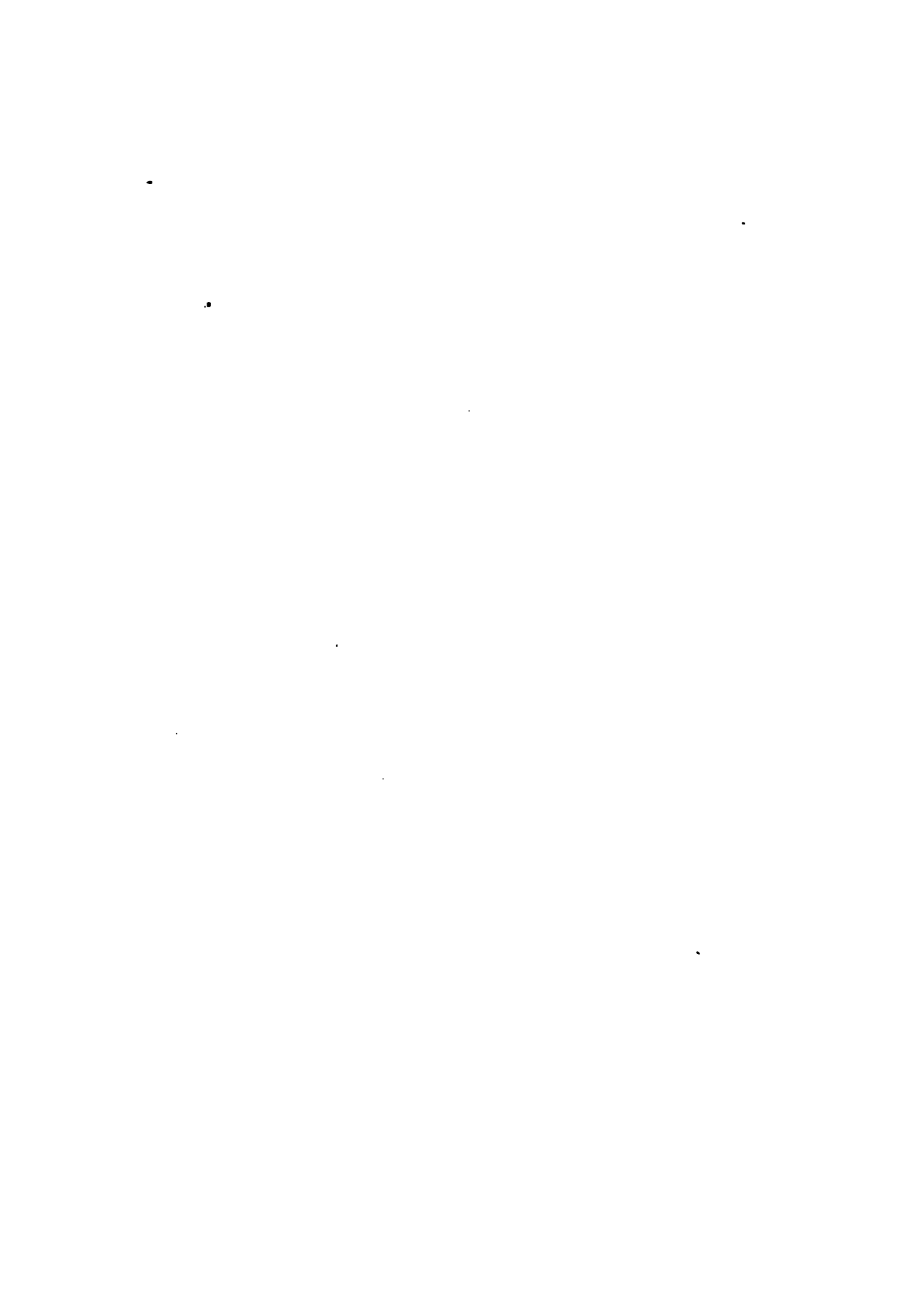
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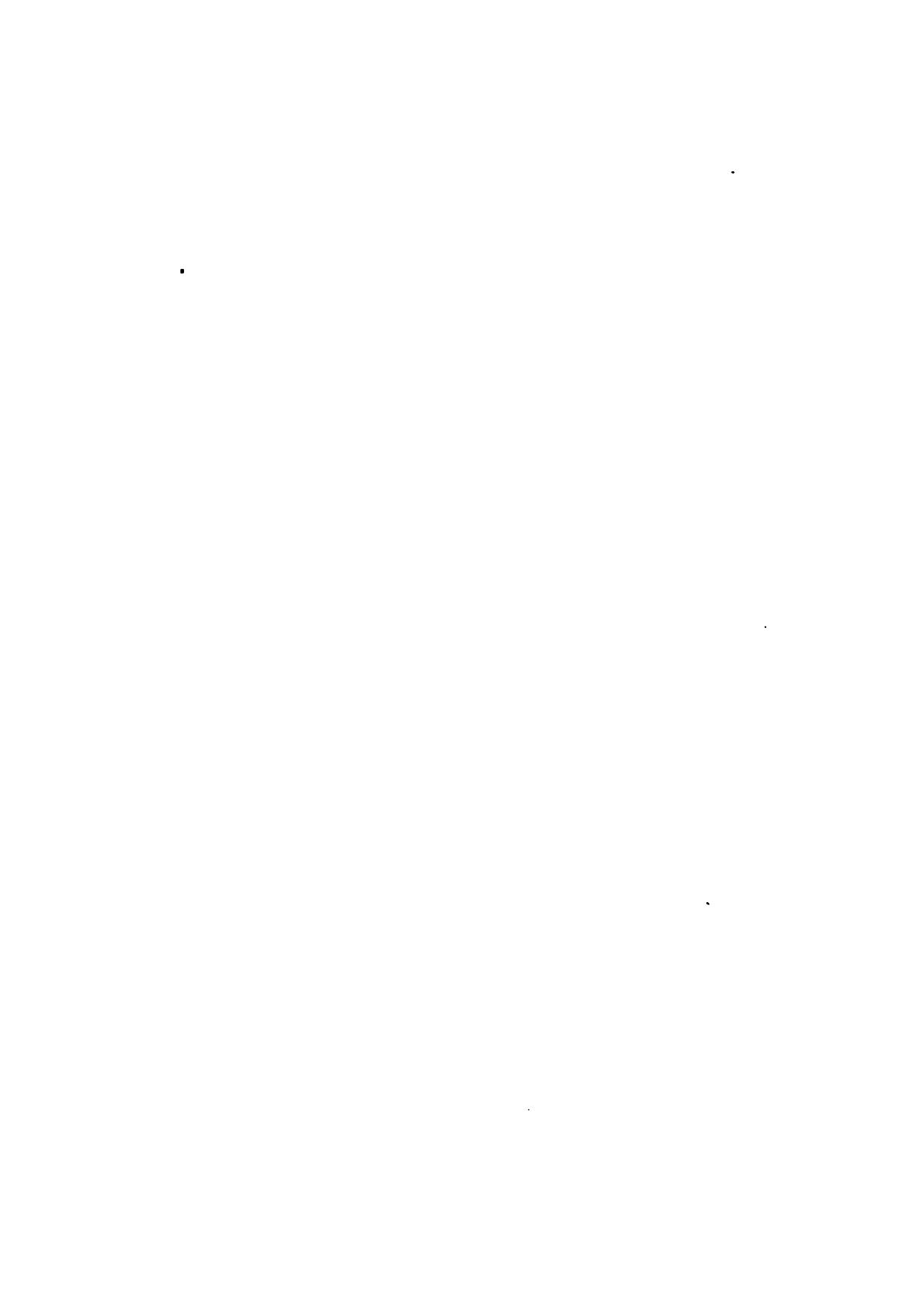
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## ADVERTISEMENT.



THE desire that has been generally expressed, to have the AGRICULTURAL SURVEYS of the KINGDOM reprinted, with the additional Communications which have been received since the ORIGINAL REPORTS were circulated, has induced the BOARD OF AGRICULTURE, to come to a resolution, to reprint such as appear on the whole fit for publication.

It is proper at the same time to add, that the Board does not consider itself responsible for every statement contained in the Reports thus reprinted, and that it will thankfully acknowledge any additional information which may still be communicated.



## PREFACE.

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IN drawing up the Survey of South Wales, I have taken the liberty occasionally of inserting the names, or initials, of such persons as I either conversed or corresponded with, on the various subjects which it includes; trusting that in so doing, no umbrage will be given: and for such assistance, I have to acknowledge my obligations,

### *In Radnorshire—to*

Walter Wilkins, Esq. M. P.	Rev. Mr. Powell
T. F. Lewis, Esq.	Rev. W. J. Rees:
T. Grove, Esq.	

### *In Cardiganshire—to*

Thos. Johnes, Esq. M. P.	Rev. J. Jenkins
W. O. Brigstocke, Esq.	Mr. G. Jenkins
Col. Lewis	Mr. J. Bowen
Rev. J. Williams	Mr. Sheldon
Rev. D. Williams	Mr. Marsden:

### *In Pembrokeshire—to*

The Right Hon. Lord Cawdor	Rev. J. Jones
Richard Fenton, Esq.	Mr. Charles Hassall:
John Mirehouse, Esq.	

### *In Caermarthenshire—to*

The Right Hon. Lord Dynevor	H. Lewis, Esq.
Sackville Gwynne, Esq.	The Rev. Mr. Lawrence
Col. Lewis Lloyd	Mr. Hindes:
The Rev. T. Beynon	



*In Brecknockshire—to*

Sir Edward Hamilton  
 Rev. Fleming Gough  
 Edward Frere, Esq.

Rev. H. T. Payne  
 Jonathan Dixon, Esq.

*In Glamorganshire—to*

Thos. Wyndham, Esq. M. P.  
 R. Jones, Esq.  
 H. Knight, Esq.  
 The Rev. Dr. Hunt  
 J. Herbert Lloyd, Esq.  
 J. Franklen, Esq.  
 Wm. Davies, Esq.

— Thomas, Esq.  
 Rev. W. Williams  
 Mr. Harper  
 Mr. Rees  
 Mr. Bray  
 Mr. H. Kirkhouse  
 Mr. Bradley :

And finally, to Mr. EDWARD WILLIAMS, of Flimston, near Cowbridge, whom I engaged from the commencement of the Survey to accompany and assist me ; and owing to his aid, and the use made of his papers, the following Survey is written in the first person plural.

I too fondly cherished the hope, that I should have made an honourable mention of the names of other living friends, who were as communicative as they were intelligent—Theo. Jones, Esq. of Brecon ; the Rev. T. Griffith, late Secretary of the Cardiganshire Agricultural Society ; Tho. Hassall, Esq. of Kŷl Rhiwau in Pembrokeshire—but alas ! they are now no more—peace to their revered shades !

As the sheets were sent off to the press just as they were ready, many inadvertencies must of course have taken place, for want of the usual oppor-

opportunity of reference ; such as repetitions of what had passed, and omissions of what had been previously promised : for such inaccuracies, I hope this apology will be accepted.

The period in which this Survey was drawn up, was a period of unparalleled exertions for regaining the liberties of Europe ; and blessed be the Supreme Ruler of all events, those exertions have been crowned with complete success. Then hail, hail ! heaven-born Peace—thou art about to return to thy terrestrial throne : may all the nations of the earth long enjoy thy blissful presence, and experience thy inestimable value : may Britons devote themselves to the study and perfection of thy arts ; and among others, to the improvement of the soil and the multiplication of the resources of their native land : may they, for the future, excel as much, in the cultivation of thy blessings, as they have hitherto done in the prosecution of the arts of war.

W. D.

*April 20, 1814.*



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## A SHORT GLOSSARY OF TERMS,

MADE USE OF IN THE COURSE OF THIS WORK.

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*After-math*, or after-grass—the second crop, to be grazed in autumn, or the beginning of winter. See *latter-math*.

*Bagging*—a slovenly method of reaping, by repeated strokes against the standing corn. When wheat was altogether hand-reaped, the term bagging was applied to the cutting of pea crops with a hook in each hand. See the Middlesex Report, by Middleton, on this kind of reaping.

*Bearding* a fence—to lay dead trowse, of thorns, &c. on the outside of newly-set staggards or plashed hedges, at the base, to prevent the intrusion of sheep, &c.

*Bout* (about)—two plits or furrows, or one round of ploughing.

*Brace*—the refuse of hearths, where coal is reduced to cokes, or charcoaled, for the use of blast-furnaces, &c.; a good top-dressing on cold rushy soils.

*Brick-earth*—a strong loam, consisting of clay and a due admixture of sand; so as to be fit for making bricks without any fossil addition. This soil is commonly reckoned too valuable for the purpose, and a clayey spot is fixed upon; to which river sand is carried, sometimes from a considerable distance. These artificial mixtures are seldom made with proper care, and the bricks in consequence are frequently of very inferior quality.

*Brush*—stubble; commonly applied to that of a green crop, as pease, clover, &c.

*Butt*—a ridge of ploughed land: in Welsh, *grwn*, from *crwn*, round.

*Cope*, *cop*—the first plit of a butt or ridge; the *teer* of Tull.

*Couch*, *squitch*, &c.—roots of varieties of grasses, difficultly cleared from tilled land: the most troublesome in fields are those of the bulbous couch (*avena elatior*)—the soft meadow-grass (*holcus mollis*); and in gardens, the creeping couch or dog-grass (*triticum repens*).

*Clunch, cleft, liman*—the aluminous shale of coal-mines.

*Dish* in wheels: A wheel is said to be of a small dish, when it nearly represents the section of a cylinder; and of a great dish, when it represents that of a cone. Wheelwrights have a gradation of scale, such as two, three, four, &c. inches dish: in Welsh, *cupan olwyn*; the concave of the wheel.

*Fog*—summer's grass preserved till winter, or the following spring.

*Haddocks*—field mows, shocks, stacks, for the temporary preservation and seasoning of corn in the fields.

*Haver*—wild oat, land oat (*avena fatua*): an inferior hairy oat in Norfolk is called *haver*; probably the same as that called Ccirch Teivi, or Cardiganshire oat.

*Hazel mould, or ferny soil*—a soil favourable to the production and growth of *hazel* trees and *fern*. In consistence, it is a medium between the strong and the light soils; more inclined towards the latter than the former. It is easily reduced by tillage; one of the best, resembling the light loams, for bearing all weathers. Where it lies convenient, it may be much benefited by irrigation. This soil commonly lies upon *till*.

*Hogging* a fence—a term borrowed from the jockeys—cutting down a fence to a certain convenient height; occasionally plashing a few, to intertwine with the uprights. This seems to be the "buck-stalling" operation reprobated in Norfolk: it should not where be tolerated, as it hastens the ruin of the fence.

*Latter-math*—the second crop of hay, in the same summer; to be distinguished from *after-math*, which implies a depasturing crop.

*Miren*—the dung-heap in a farm-yard.

*Muck*—dung; farm-yard manure.

*Plashing, pleaching*—the operation of laying a quick fence of proper growth, so as to be more impervious for animals: it moreover ensures, by periodical repetitions, the duration of the fence, owing to successions of sprouts from the roots; whereas by *hogging*, or "buck-stalling" a fence, the growth is confined to tufts on the top of the fence, whilst the roots are doomed to decay. *Plashing* is performed by cutting a notch on one side, a few inches above ground, and laying down the wood to a certain

certain angle of elevation. See vol. I. p. 246. If the fence be of a strong growth when this operation is performed, few or no dead stakes will be necessary, as the strongest quicks at proper distances will be reserved for the purpose; which strengthen the fence, and confine the *pleachers* in their proper situations. As a finishing, the tops of the quick uprights, or stakes, are wattled strongly with rods, selected for the purpose, called *catherings*, in Welsh, *crwydd*, and *plethau*.

*Plit*—the slice cut by the plough out of the furrow.

*Rammel, catbrain*—an indurated substance, consisting of clay, sand, and gravel, cemented together: it is commonly impervious to water in its natural state, which preserves its interior dry under the wettest surfaces. It is a common base of drains in a poor meagre soil, after cutting through a spit or two of the surface-soil of clay, till, or peat. Its colours—grey, blue, and the orange oxyd of iron.

*Rean, rine*, (in Welsh, *rhyck*)—the hollow or furrow between two butts or ridges.

*Rick, reck*, (*mwddwl*)—a round or conical stack of corn or hay.

*Roan, red*—the pearly reddish hue of barley grain previous to its becoming horny, or dead ripe. See vol. I. 460.

*Rouen*, (*adladd*)—after-math preserved till spring; distinguishable from *fog*.

*Shale, rub, rock, shiver*—an argillaceous stone or rock, of a loose friable texture; colour, various shades of grey. The gravel of rivers flowing from mountains of this substance, is very perishable on roads. It has varieties of a firmer texture, some grey, and some inclining to purple, which, well laid in mortar, will do for building-stone. The best use these kind of stones can be applied to is for draining.

*Spit*—the slice cut by a spade: a spit deep, in digging, about nine inches.

*Stack, (dás)*—a large heap of corn or hay, with four angles.

*Staddles*—frames from two to three feet high; either of solid masonry, or of pedestals and capstones connected by wooden beams; on which corn stacks are laid, to preserve them from vermin.

*Staggards,*

**Staggards, Welsh quicksets**—well-grown brushwood, transplanted from woods, &c. into a hedge which, properly managed, forms an immediate fence. See vol. I. 251.

**Sward**—the unmoved surface of meadow or pasture land.

**Saving**—a quick method of reaping, chiefly practised in Cardiganshire; different from hand-reaping and bagging.

**Till**—a hungry soil, frequently of a dingy orange colour, lying between hazel-mould surface and rammel base; and is a medial link between both, in quality as well as situation. In elevated tracts, to the grief of the farmer, it forms frequently the surface soils; producing unpalatable grasses, heath, the dwarf gorse, mountain ash, birch, bird-cherry, &c. Valuers of land, who judge by taste, might here venture to trust their eyes.

**Trefoil**—strictly speaking, means any plant with its leaves—three together; hence the *Menyanthes trifoliata*, or hog-bean (*ffŵr corsydd*) is called marsh trefoil: but mere farmers, in this district, know no plant by the simple name *trefoil*, save the *yellow* or *hop-clover*.

**Trig**—a slice of the sward cut out to shew the boundaries of allotments, &c. in enclosures of wastes; with a T mark on the side where the future fence is to be made, which decides the fencing between A and B, &c. In South Wales, holes dug in the ground, supply the place of *trigs*.

**Trowse**—cut underwood, for hedging, fencing against rivers, &c.

**Wattle**—intertwined trowse, or dead brushwood, for a temporary fence.

**Whisp, skep, (pillion)**—a sheaf or bundle of straw, bound after being flail-thrashed; generally of winter corn wheat, or rye.

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## ERRATA.

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- Page 17, line 11, *for* Hil-rhiwau, *read* Kil-rhiwau.  
 — 29, — 2 from the bottom, *for* lamina, *read* laminar.  
 — 32, — 6, *for* peterogeneous, *read* heterogeneous.  
 — 32, — 14, *for* marl with, *read* marl without.  
 — 34, — 7, *for* Acron, *read* Aeron.  
 — 38, — 4, *for* monarchy, *read* monarchs.  
 — 42, last line, *for* barley, *read* wheat.  
 — 44, line 5, *for* Romist, *read* Romish.  
 — 47, — 11, *for* our, *read* four.  
 — 51, — 18, *for* acid, *read* arid.  
 — 94, — 9, *for* the sea-coast, *read* on the sea-coast.  
 — 95, — 4 from the bottom, *for* Saxon, *read* Saxum.  
 — 101, — 25, *for* Ogsor, *read* Ogwr.  
 — 123, second Note, reference to p. 100, *read* p. 127.  
 — 137, — 5, *for* Dimæ, *read* Dimetæ.  
 — 152, — 13, *for* north-west, *read* south-west.  
 — 153, — 24, *for* at Newfont at, *read* in the new font.  
 — 180, — 15, *for* be believe, *read* we believe.  
 — 191, — 19, *for* strong soils, *read* stony soils.  
 — 208, — 7, *for* bull boarded, *read* full boarded.  
 — 232, — 15, *for* Llanawan, *read* Llanarvan.  
 — 239, — 7, *for* pen-gorse, *read* hen-gorse.  
 — 511, last paragraph, *for* croin, *read* crvin.  
 — 522, line 12, *for* corn, *read* seed.  
 — 592, fifth paragraph, *for* soils England, *read* soils in England.  
 — 610, second paragraph, *for* to pay, *read* of hay.



1. The first part of the document is a list of names and titles, including "The Hon. Mr. Justice" and "The Hon. Mr. Justice".

# AGRICULTURAL SURVEY OF SOUTH WALES.

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## CHAP. I. GEOGRAPHICAL STATE AND CIRCUMSTANCES.

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### SECT. I.—SITUATION, FORM, AND EXTENT.

**SOUTH WALES** is situate between  $51^{\circ} 18'$ , and  $52^{\circ} 25'$ , of northern latitude; and  $3^{\circ} 0'$  and  $5^{\circ} 30'$ , of western longitude from Greenwich:—It forms the central of the three grand western promontories of South Britain; being separated from the promontory of Devon and Cornwall, on the south-east, by the Bristol Channel; and from the promontory of Llein in Caernarvonshire, on the north-west, by that part of St. George's Channel called Cardigan Bay. In shape it is somewhat triangular, similar to that of North Wales, having the land mere on the east for its base, the sea coasts of the two Channels for its sides, and St. David's Head, on the west, for its apex:—

On the east it is bounded by the counties of Monmouth, Hereford, and Salop; on the north by Montgomeryshire, and part of the river Dovey separating it

S. WALES.]

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from

from Meirionyddshire. The length of this land boundary from the mouth of the Romney near Cardiff, to the Kerry hills, on the confine of Montgomeryshire, and from thence to the sea at the mouth of the Dovey, may be estimated at about 120 miles. Its marine boundary, from the mouth of the Dovey, along a coast of slate and grey mountain rock, freestone, marl, and sand, to St. David's Head, about 79 miles:—From St. David's Head, along a deeply indented sea-coast, chiefly of limestone, back again to the mouth of the Romney, about 151 miles;—making in the whole, tracing the zig-zag windings of the coast, a circumference of about 350 miles:—

Its length, from the apex of the triangle at St. David's Head to the extreme points of the base, at the mouth of the Romney on the south, and the river Tame on the junction with the counties of Salop and Montgomery on the north, and to a central point on the base line at the entrance of the river Usk into Monmouthshire;—is nearly equal, being about 99 miles:—

Its greatest breadth, in a direct line near the base, from Breaksea Point in Glamorganshire to the northern point in Radnorshire, joining the counties of Salop and Montgomery, is about 75 miles; and from Porth Einion Point in Gower, to Aberdyfi on the border of Meirionyddshire, about 68 miles. Its narrowest breadth is across the base of Pembrokeshire from Fisgard to Sander's Foot, near Tenby.

Its area, as estimated by Templeman, is 3860 square miles, or 2,470,400 acres; being  $7\frac{1}{2}$  acres per head, according to the population enumerated in 1811: but by Mr. C. Smith's maps, published in 1808, South Wales, contains 4297 square miles, being 77 persons to every square mile, or about  $8\frac{1}{4}$  acres per head.

## SECT. II.—DIVISIONS.

THE Divisions of the District are of three kinds—Physical, Ecclesiastical, and Political. The first will be more appropriately treated in Section 4, on *Soil and Surface*.

The *Ecclesiastical* Division is into two Dioceses, St. David's, and Llandaff; and both subject to the Metropolitan See of Canterbury. The Dioceses are subdivided into Deanries, and those again into parishes.

The *Political* Division, by Henry VIII. was into six Counties, each county having a Lord Lieutenant and other inferior Officers of the Crown. The counties are divided into hundreds, or separate jurisdictions of so many chief-constables. Hundreds are divided into parishes; and these again into townships, hamlets, parcels, or petty constablewicks, as they are variously called in different parts. Parishes are of very unequal extent; some below 300 acres; several from 400 to 800; whilst others are from ten to twenty, and even thirty thousand acres\*.

The particulars of each of the six Counties are as follow :

---

\* In Jones's History of Brecknockshire, p. 360, and in Carlisle's Topography of Wales, the parish of Talgarth is erroneously stated to contain 90,145 acres, according to a survey taken in 1801. I have seen the paper from whence the account was taken: Talgarth contains 19,145 acres. This correction is not intended as a detraction from the merits of those publications: they are both valuable acquisitions to Welsh Literature.—H. D.



### I. *BRECKNOCKSHIRE,*

Is an inland county, bounded on the north by Radnorshire; on the east by the counties Hereford and Monmouth; on the south by Glamorganshire; and on the west by the counties of Caermarthen and Cardigan: it is divided into six hundreds—Talgarth, Crickhowell, Pencelli, Dyfynoc, Merthyr, and Buallt; and into 61 parishes. It has four market-towns—Brecon, Hay, Crickhowell, and Buallt.

Its greatest length is from the boundary of Penderyn parish, near Hirwaun iron-furnaces, on the south, to Llanwrthwl on the banks of the Elain on the north, about 40 miles: its greatest breadth from Glangrwyne forge on the east, to Ynys Cedwyn iron-furnaces on the west, about 33 miles: its smallest dimension is across the hundred of Buallt from the boundary of Caermarthen-shire on the west, to the Wye near the town of Buallt, about 13 miles. Its superficies, by Templeman, is 770 square miles, or 492,800 acres; being 13 acres per head, according to the population of 1811: by Smith, it contains only 731 square miles, being 51 persons to each mile.

### II. *CAERMARTHENSHIRE,*

Is bounded on the south by Caermarthen Bay; on the west by Pembrokeshire; on the north by Cardiganshire; and on the east by the counties of Brecon and Glamorgan. It is divided into eight hundreds—Cethinog, Elvel, Pervedd, Caio, Iscennen, Carnwyllion, Derllys, and Kidwelly; and into 87 parishes. It has eight market-towns—Caermarthen, Kidwelly, Llanelly, Laugharne, Llandeilo, Llandovery, Llangadoe, and Newcastle-

Newcastle-Emlyn.—Its greatest length, from the river Cleddeu, bounding Pembrokeshire on the west, to the boundary of Brecknockshire near Llwydlo Vach on the east, is about 50 miles; and its mean breadth about 25 miles.—Its area by Templeman, is 869 square miles, or 556,160 acres; being seven acres per head according to the last enumeration: by Smith, it contains 928 square miles, being 83 persons to a square mile.

### III. CARDIGANSHIRE,

Is bounded on the north-west by Cardigan Bay: on the north by Meirionnyddshire; on the east by the counties of Montgomery, Radnor, and Brecknock; and on the south by those of Caermarthen and Pembroke: it is divided into five hundreds—Geneu'r Glyn, Har, Penarth, Moeddyn, and Troed yr Aur; and into 64 parishes. It has five market-towns—Cardigan, Aberystwyth, Tregaron, Atpar, and Llanbedr (*vulgo* Lampeter). Its length, being sea-coast, from the river Dovey on the north, to the Teivy on the south, is about 46 miles; its mean breadth, that is, from New Quay Point to the Teivy at Llanbedr, is about 18 miles. Its quantity by Templeman is 646 square miles, or 413,440 acres; being about 8½ acres per head: by Smith, 726 square miles, being 70 persons to each mile.

### IV. GLAMORGANSHIRE,

Is bounded on the north by Brecknockshire, and part of Caermarthenshire; on the east by Monmouthshire; on the south by the Bristol Channel; and on the west by the Bay and County of Caermarthen. Its dimensions have been published \* at 50 miles in length, 24 miles in breadth, and 145 in circumference. Its shape is so

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\* In the original Report, &c.

irregular, that it is difficult to be decisive on the subject. Were it divided into two parts, the part east of the river Neath would approach somewhat to a circle of about 28 miles in diameter; the part west of Neath including Gower, would be an irregular oblong of 33 miles by nine. Its land and sea boundary are nearly equal, being about 79 miles each, which makes its circumference 158 miles. This county is divided into ten hundreds—Caerphili, Miskin, Newcastle, Cowbridge, Kibwr, Dinas Powys, Ogmore, Neath, Swansea, and Llangyfelach; and into 118 parishes. It contains nine market-towns—Cardiff, Caerphili, Llantrisant, Cowbridge, Bridge-End, Aberavon, Neath, Swansea, and Merthyr Tudful. According to Templeman, it is 670 square miles, or 428,800 acres; being about 5½ acres per head; by Smith, it contains 822 square miles, being 98 persons to each mile.

#### V. PEMBROKESHIRE,

Is the most western, and most maritime county of South Wales; its sea-coast being double the extent of its land boundary; it is bounded on the south by the Bristol Channel; on the west by the Irish Channel; on the north-west by Cardigan Bay; on the north-east by the county of Cardigan; and on the east by Caermarthenshire. It is divided into seven hundreds—Castlemartin, Rhos, Narberth, Dau-Gleddeu, Dewi's Land, Kemmaes, and Kil-garon; and into 145 parishes. It has six market-towns—Haverfordwest, Pembroke, Tenby, Narberth, Fisgard, and Newport. It is of no use to guess at the length and breadth of such a shapeless figure: if it can be called any thing, it is a very irregular polygon, of the mean dimensions of 26 by 21 miles: Templeman, however, found means to estimate its superficies at 520 square miles, or 332,800 acres, being

being nearly  $5\frac{1}{2}$  acres per head: by Smith's maps it contains 575 square miles, being 105 persons to each mile, by the returned population of 1811.

## VI. RADNORSHIRE,

Is an inland county, bounded on the north by the counties of Montgomery and Salop; on the east by the county of Hereford; and on the south and west by the counties of Brecon and Cardigan. It is divided into six hundreds—Painscastle, Radnor, Knighton, Kevn Llys, Colwyn, and Rhaiadr; and into 52 parishes. It contains four market-towns—Presteign, Knighton, Radnor, and Rhaiadr. It is the most regular in shape of the six counties; making a trapezium of the mean dimensions of about 22 miles by 20: Mr. Clark estimated the area at 510 square miles; which Templeman had reduced to 385 miles, or 246,400 acres, being less by one half than his estimate of the county of Brecknock. If Smith's map has any claim to correctness, it proves both these estimates to be wrong; for by dividing the surface of the county into squares, according to the scale of miles, the whole of Radnorshire will amount to 447 square miles\*; being 63 square miles less than the estimate by Mr. Clark, and 62 square miles more than that by Templeman.

It will scarcely appear credible, that *old* Speed's maps give a more accurate delineation of the situation of places, courses and falls of rivers, &c. than any of the present general maps, which boast of modern improvements.

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\* The Rev. W. J. Rees, rector of Cascob, in this county, estimates its area at 455 square miles, or 291,200 acres; being about  $13\frac{1}{2}$  acres per head; or nearly 48 persons to a square mile.

Some account of the *islets* on the coast; and extra-parochial places, whether inland or in the sea, may not be considered too foreign for a kind of Appendix to this Section.

*Islets*.—Beginning in the eastern part of the Bristol Channel, and omitting such small rocks as are fit only for light-houses, the *first* to be noticed is *Barry*, separated from the main land only by the operation of the tides. It is about nine miles south-west of Cardiff; contains one farm-house, occasionally let as lodgings for sea-bathers, about 300 acres of land depastured by a few cows, sheep, and numbers of rabbits: rent 80*l*.—It is on a limestone rock, containing, according to report, ores of lead and zink.

2. *Caldey*, is off the coast of Tenby in Pembroke-shire, about two miles from the main land; in the parish of Penaley;—about one mile in length, and half a mile in breadth; soil fertile: it is a mass of limestone, which is quarried, and also burnt, for exportation.

3. *Skokham* is not three miles from the main land; about five miles west by north of St. Anne's Point, at the mouth of Milford-Haven. It is about 200 acres, and rented at 10*s*. an acre; depastured with sheep, &c.; rabbits numerous; fresh water plentiful. It has a tur-bary of five or six acres, affording excellent fuel. The southern moiety of its substrata is red-rabstone, and the northern part is limestone. It is extra-parochial.

4. *Skomar*, lies due west of Skokham\*, and is separated

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\* More than two centuries back, George Owen, in his History of Pembroke-shire, wrote the names of these two islets more correctly than they

rated from it by a strait of one mile and a half in breadth, called Broad Sound. It is considered as a part of the parish of St. Martin's in Haverfordwest: it abounds with rabbits; is plentifully stored with water; contains about 700 acres, whereof a considerable portion is under tillage, and let to a resident tenant: it consists of limestone.

5. *Ramsey*, is off the coast, and in the parish of St. David's: it is about three miles long and one broad: it was formerly under tillage, but is now depastured by sheep and horses; seals are numerous. This islet, and seven rocks to the south and west of it, gave rise to a low witticism among map-makers and others, who call them *The Bishop and his Clerks*, probably from their vicinity to the ancient metropolitan seat of St. David's. Whether Ramsey is to be considered as the rock designated by the superior appellation, is not clear; it may, however, be presumed, that these rocks caused the ancient geographers to call St. David's Head—*Promontorium Octo-petrarum*.

#### *Extra-Parochial Places.*

1. *Skokham* has been already noticed.

2. *Highlight*.—Two farms of about 400 acres; adjoining the parish of Merthyr Dyvan, seven miles S.W. of Cardiff, in Glamorganshire.

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they are written at present. Skomar he wrote *Scalm-ey*, and Skokham *Stack-belm*. The latter name may have been given by the northern pirates of the ninth or tenth century, when they infested most of the British coasts, in honour of a northern metropolis; or it may have been called *Scalk-belm*, *lurking-isle*.

3. *Llanoc-*

3. *Llanoethin*.—Four farms of the annual value of 600*l.*, contiguous to the parish of Llangarvan, about four miles S.E. of Cowbridge.

4. *Skeir*.—One large farm of several hundred acres, adjoining Skeir Point, about six miles S.W. of Bridge End.

These, and such extra-parochial tracts, pay neither poor, church, nor county rates. Persons gaining apparent settlements within them, and afterwards becoming burdensome elsewhere, cannot by the present laws be removed into them by orders of magistrates.

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#### SECT. III.—CLIMATE.

CLIMATE, in its original acceptation by Geographers, was applied to define a certain tract of the surface of the earth, bounded by imaginary circles parallel to the equator, and of such breadth from south to north, that the length of the longest day therein differed half an hour from that of the next contiguous climate or parallel circle. Taking the term in this light, South Wales lieth partly in the ninth and partly in the tenth northern climate. But this geographic definition is of no use whatever to the Agriculturist;—for by it the eternal snows of Chimboraco are in the same climate as the neighbouring lower valleys of Peru, which are scorched by the heat of the torrid zone; or, comparing small things with great, the summit of the Brecknock beacon is in the same climate as the Vale of Usk at Abergavenny.

Upon a great scale, different degrees of latitude cause  
a pro-

a proportionate variation in degrees of climature: hence the great difference in every respect, in air, soil, and produce, in national manners and character, that exist between the equator and the tropics, and between the latter and the polar circles: but in small districts, like this under survey, difference in latitude, independent of other causes, is too inconsiderable to have any visible effect. There must be, therefore, various causes producing various effects, on the temperature of the air, dryness or wetness of seasons, degrees of fertility in soils, &c. &c.: and these are, degrees of elevation from the level of the sea; situation, whether maritime or inland; aspect or exposure to different points of the compass, &c.

The climatures of this district may be sufficiently minute when divided into four classes.

1. The maritime limestone tracts of the counties of Glamorgan and Pembroke, which will be more particularly described in the Sections on Soils and Minerals. The Vale of Glamorgan hath the Bristol Channel to the south, and is screened from the north by the high mountainous coal-tract. Being moreover level, extensive, and consisting of good sound soil on a basis of limestone, the climature may be anticipated to be in a high degree salubrious. Hence the size and delicacy of its native domestic animals, sheep and cattle; and the health, and frequent extreme longevity of its inhabitants. The southern winds are superterrene at a distance, passing over the counties of Somerset and Devon before they cross the Channel. The promontory of Gower lies more open to the ocean, and has consequently a greater share of super-marine winds: but Pembrokeshire is more fully exposed to the south-western winds of the Atlantic than any other Welsh county; hence its climature

is



is found to be more humid; hence also its greater mildness of air, less cold in winter, and in general the summer heat is also more moderate. Severe frosts are seldom experienced. Snow never lies long on the ground, but dissolves generally in two or three days after its fall. A range of mountains bounding this tract to the north, collect about their lofty heads the watery vapours brought by the prevailing south-western winds from the Atlantic, from whence they descend in frequent showers of drizzling rain, and often in heavy torrents, surprising the farmer in the southern more open parts of the county with unexpected floods, he having seen no rain that could be productive of them.

Myrtles, arbutus, and other tender exotics, that require housing in winter in most parts of Britain, bear the open air all the winter in these parts, as well as in the opposite coasts of Devon and Cornwall. And strange as it may appear, it is generally observed, that fruits ripen sooner, and more perfectly, in the cooler and more humid air of sea coasts, than in the hotter and drier air of the interior parts of the island. The sea-coast air, where the soil is open, and on a dry basis, without marshy fens, as this limestone tract is, is found by experience to be more salubrious than that of more inland situations; and as it is so to animal, why may it not be also more favourable to vegetable life? This however may be controverted on the oxygen and hydrogen theory.

This mildness and humidity of climature, renders the soils of this tract, where they are of a sufficient depth and staple, uncommonly productive of grass. Crops of corn, and even of turnips, &c. well hoed, are frequently very materially injured by the abundance and luxuriance of natural grasses; a luxuriance that has frequently

quently baffled all the precautions of clean fallowing and hoeing. The drillers of the dry inland or eastern counties of England may laugh at this; but in so doing they reckon without their host.

2. *Vales*.—These may be subdivided into two classes:—*First*, vales opening *inland*, towards the *east*; such as those of the rivers Wye and Usk, in the counties of Brecon and Radnor. The south-western vapours from the sea are frequently arrested by lofty mountains to the west before they arrive here; hence here is less rain than in the tracts before described. Consequently these, and such like vales, are not so subject to be overrun with natural grasses; and grain fills better in the ear. Owing to their inland situation, these vales have a greater share of cold and frosts in winter, and of heat in summer.

*Secondly*, Vales opening *westwardly* to the *sea*; such as those of the rivers Towy and Teivy, in the counties of Caermarthen and Cardigan. The Vale of Towy seems situate and formed in every respect by nature for a humid climature. It is environed by high mountains on all sides excepting the west and south-west, the most rainy points of the compass, and there it opens its gaping mouth to receive the accumulated vapours of the Atlantic; and acts as it were a funnel to attract clouds and mists, which are broken by the mountains, and fall in frequent showers. Hence the complaint of farmers of their crops of grain, especially wheat crops, being too much choaked with grass to be productive; and the moisture of the air is generally such, that wheat seldom affords a good sample. The air is extremely mild in this vale until it approaches its north-eastern extremity in the mountains. Rime, a kind of hoar frost, much aiding the beauty of a winter landscape, when

when hanging on firs and pines, is scarcely known here. An old man, about 70 years old, said he had not seen it there during 30 years residence, at any period of his life, till in the winter of 1804. Rime is nevertheless frequent in the Vale of Usk; even in the town of Brecon.

The river Teivy runs nearly parallel with the Towy towards the south-west; but its vale is not subject to so moist a climate. It is of a different formation; its powers of attracting rain are weaker. It also opens to a narrower sea, opposite Ireland; and the range of mountains separating the two vales, intercepts much rain from the south, and bestows it on Caermarthen-shire.

3. The western coast of Pembrokeshire and Cardiganshire, upon slate rock or rab, is somewhat colder than the maritime limestone tracts, and more exposed to western storms immediately from the sea. The barley of this tract is deemed excellent; some level patches near the shore have early harvests; the adjoining hills acting as reflectors to forward the ripening of the grain.

4. *Mountains.*—These alpine tracts occupy the greater part of the district. Here winter begins early, and summer late. Rain, in lower places, is here sleet; sleet, snow; and storms, tempests. The hardier oats are the grains chiefly attempted to be cultivated, and those late sown, and of course late harvested, in a half ripened state. Inland mountains retain snow longer than those nearer the sea coast, though of less elevation. Conical hills do not retain snow as long as others of a more square or extended summits, though of greater altitude. The effect of sun and atmosphere is more powerful upon the former; and the greater the extent or quantity of snow in the aggregate, the greater will

will be the degree and duration of cold occasioned by it, to counteract the thawing agents.

“ Merthyr Tudful lies 25 miles north of Cardiff in Glamorganshire, and at the height of 568 feet from the level of the Bristol Channel. The annual difference in temperature of the air between these two places is about 11 degrees of Fahrenheit, but the temporary difference is often much greater. In the valley near Cardiff the snow seldom lies above 48 hours. The 21st of April, 1809, the hills near Merthyr were covered with snow for ten days, whilst the plains about Cardiff were green. Increase of depth of snow is in proportion to the distance from the sea. Snow commonly dissolves on its fall within two miles of the shore; at the distance of five miles, near the entrance of the hills, the ground would be covered, and gradually increase upwards, so as at Merthyr to be two or three feet deep.”—*Meteorological Tracts*, by Colonel Capper, p. 14.

*Meteorological Observations, from the same Writer.*

Monthly mean of the temperature of the air at *Cathay*, near Cardiff, from the year 1800 to 1807, both inclusive; latitude  $51^{\circ} 29'$ ; longitude  $3^{\circ} 26'$  west from Greenwich; Fahrenheit's thermometer suspended seven feet from the ground, in a court enclosed by walls on three sides, and open to a lawn on the north; height above the Bristol Channel 30 feet; distance from it two miles:

January,

January, .....	36 56	July, .....	66 31
February, .....	38 18	August, .....	65 6
March, .....	42 25	September, ...	58 75
April, .....	50 37	October, .....	50 62
May, .....	58	November, ...	40 75
June, .....	63 37	December, .....	37 93*

Monthly mean, upon an average of the eight years, .....	} 50 68
Mean diurnal heat from six in the morning to ten in the evening, .....	} 51 00
Mean nocturnal heat from ten in the evening to six in the morning, .....	} 49 00
Mean annual maximum of heat on an average of eight years, .....	} 66½
Mean annual minimum of ditto, ditto, .....	36 56
The greatest temporary heat during the above observations, .....	} 86 00

The greatest temporary cold, 28th December, 1798, the thermometer descended to 11 of Fahrenheit, or 21 degrees below the freezing point.

By a rain gauge kept at Frampton, in Glamorgan-shire, by Nathaniel Pigot, Esq. F.R.S. about the year 1778, lat. 51° 25' 1", the average annual quantity was 25 inches. By similar observations made by Col. Capper, at Cathay, near Cardiff, for eight years, from 1800 to 1807, both inclusive, the monthly mean of rain appears as follow :

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\* We may here observe the moderation of heat and cold. July heat very little above 66 degrees, and the three colder months only a few degrees below 40. Why should invalids then be recommended to enjoy a foreign climature ?

January,



	In.	Pts.		In.	Pts.
January, .....	2	43	July, .....	2	17
February, .....	1	51	August, .....	1	53
March, .....	1	35	September, .....	2	9
April, .....	1	29	October, .....	2	12
May, .....	2	4	November, .....	2	60
June, .....	1	17	December, .....	3	40
			In. Pts.		
General monthly mean, .....			1	99	
General annual mean, .....			23	76	

The annual mean for twelve years of rain fallen in the north part of Pembrokehire, observed by Thomas Hassall, Esq. of Hil-rhiwan, was 29 inches. By this it appears, that long and vexatious drizzles, rather than heavy rains, are those that prevail mostly in this climate, that is estimated so humid. This must be the case, if, as it is reported, the annual rains in Staffordshire amount to 36 inches, and those of Lancashire to 42 inches and more. According to Mr. Theophilus Jones, in his History of Brecknockshire, the rain that fell in the town of Brecon in the year 1802, was  $26\frac{1}{2}$  inches, and in London the same year  $15\frac{1}{10}$  inches.

Mr. A. Walker, the experimental philosopher, in his "*Tour to the Lakes*," in the year 1792, expatiates on the blessings of a moist climate. "Why then should we repine (says he) at the moisture of our island? Were we in the moon, our telescopes would show that this island is more green than any spot on the face of the earth. This verdure we owe to rain; in consequence, our cattle, horses, sheep, exceed those of any other country."

Extraordinary instances of longevity in the Vale of Glamorgan, will be noticed further on, in the Section

on Cottages; which are rationally accounted for by Mr. Edward Williams, by attributing them to the combined influence of *climate*, soil, and peculiar regimen. See Malkin's Tour, Vol. II. 545, 8vo. edit.

“On soils precisely the same in their texture or component parts, we find the *corn* much better in every respect, especially *wheat*, in the *eastern* than in the *western* counties; a fuller and heavier grain, which ripens in greater perfection; but *pasturage* in the western counties, is much more abundant than in the eastern on the very same kind of soils, owing to the greater humidity of the air. The soils of the western counties are generally lighter than those of the eastern counties; and for that reason, might be supposed earlier in spring and harvest; but owing to the general humidity of the air, harvest is a fortnight later, especially that of wheat, which commonly commences in Brecknockshire and Glamorganshire the first week in August, and sometimes the last week in July; but very seldom in the western counties before the third week in August, excepting a few earlier spots, which form exceptions to the general rule.”

“Mr. Marshall, in his Rural Economy of the West of England, observes, that the harvest in most parts of Devon and Cornwall, is generally later by a fortnight at least, than in the midland counties of even two and a half or three degrees more northward. This seems to be partly owing to their western maritime situation. The case is the same with the western counties of Wales, which partake much of the Irish climature; less cold in winter, less warm in summer, but more humid all the year round; of course, corn and fruit are later in ripening than in level counties more distant from the Atlantic. Devon and Cornwall, like the Welsh counties,

fies, are also of very uneven surfaces; so that from them the reflections of the rays of the sun are greatly deranged. This reflection has been sufficiently ascertained to be in all climates the cause of heat, and not the difference of mere distance from the sun, which, considering how immense it is, the difference between that of the equator and the pole is so much a mere nothing, that were the earth a continued plane, in a straight line, it would in all its parts be equally warm; or, at least, one place would not differ more in degree of heat from another, at any time of the year, than one spot would be that was the ten thousandth part of an inch farther from the fire than another. In countries where the rays of the sun fall with the least obliquity, will the greatest heats be found. In mountainous countries, the rays fall on the northern sides of the hills with very great obliquity, even in a line parallel with their declivities, even in summer, and in winter fall not at all upon many of them. Western declivities are late before they receive the morning sun, the eastern declivities lose it early in the evening; so that valleys running north and south, have, in general, between their morning and evening, less one-third, and frequently one-half less of sun than open countries. In winter, a great many northern aspects receive not a single ray of the sun: this, with the eternal loss of morning and evening sun on eastern and western aspects, must produce a powerful counteraction to the effect produced by the rays of the sun falling on the remaining only one in four aspects, that is, the southern; where they fall often in as rectangular a line as under the equator. Open countries are more exposed than mountain valleys to those easternly and north-eastern winds, which in winter are usually attended with frost:



they experience for that reason a severer winter; but, lying open fully to the sun, they have a warmer and more genial summer. Mildness of air in winter is very pleasant, if not contributory to health; but mildness in summer, however pleasant, is a very unfortunate circumstance.

“ Much has been said in approbation of the West-Wallian climature, from St. David's, northward, to Caernarvon, &c.: it is favourable to grass, of course to grazing and dairy farms; but not to tillage. The fault is not in the soil, that corn, especially wheat, will not succeed: the soil of very large portions of this part of our island, is greatly superior in natural fertility, to that of a great many of the most noted midland and eastern corn counties: but soil, let it be ever so rich, without a favourable climature, will not do. Agriculturists should maturely consider these things, and draw proper inferences: this would enable them better to adopt their system to their situation. Art and industry can perform wonders on mere soil, so as to change what is in a great degree sterile, into what will be permanently fertile: but what art, what industry, can make any considerable struggle against climature? What may be done by clearing of overshadowing woods, by draining marshy lands, &c. &c. is not to be neglected; but the country line of surface will be for ever the same, and the same for ever upon it will be the effects of sun and atmosphere. Another misfortune of mountainous countries is, that mountains always gather about their heads, mists and watery clouds, and pour all around them the contents of those accumulated clouds: for this reason, mountainous countries abound much more than open tracts in grass, during dry summers; and must generally occasion grazing

and dairying to be more profitable to farmers in such situations, than tillage."—*E. W.*

*Fragments Meteorological, or illustrative of the State of Climature, &c.*

*Humidity.*—"One great inconvenience that armour will not indure in this countrye (N. W. of Pembroke-shire), halfe the tyme it will doe in the inland countries of England; for let the armour be cleaned ever soe well, and put in any roome built of this countrye stone and lyme\*, in one week it will grow rustie."—*G. Owen's Hist. Pemb. about 1600.*

*Mildness.*—"We often read of skaiting in St. James's Park, when the weather is perfectly mild and open in Pembroke-shire."—*Mr. Hassall.*

*The Seasons* are four: 1. Gwanwyn; 2. Hâv; 3. Hydrev; 4. Gauaf.

1. *Gwanwyn*, intermediate season, or course of inchoation, according to some; but though it corresponds, as to time, with the English *Spring*, yet to the illiterate Welsh, the term conveys a brumal idea, a season of severity: hence the adage, "*Hi a ddian-godd yn fynych heb auaf, ond ni ddiangodd hi erioed heb wunwyn*," i. e. The year frequently passes without the severity of winter, but never without severity in *Gwanwyn*. From this the provident farmer sees the necessity of timely economy in the use of his winter's stock of fodder. *Hanner y gwair, hanner y Gwanwyn*: half the hay should be in reserve until half the *Gwanwyn* be past, i. e. until the 25th of March:

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\* G. Owen attributes this rustiness of polished armour to the lime of the country, rather than to the *air*: for the very same cause which corrodes iron or steel, covers the ground with perpetual verdure.

and the severity of several late springs, proves that the adage is well founded. *Gwanwyn* commences with the English spring; the Feast of Purification (Feb. 2), is called *Guyll Vair dechreu'r Gwanwyn*; and the Feast of the Annunciation (March 25) is called *Guyll Vair hanner y Gwanwyn*, i. e. Lady-day, prime-spring, and Lady-day, mid-spring. The Welsh name for February is *Chwefror* or *Chwefrol*, the violent or severe month: hence *Chwefror chwerau, porchell marw*, i. e. severe February, dead pig (or litter of young)—*Pen ci ar tore o wanwyn*, i. e. a dog's head on a March morning; as much as to say, threatening mornings in *Gwanwyn* turn out fair evenings. A dog growls and threatens with his mouth, whilst he shews signs of friendship with his tail.

2. *Hâv* corresponds with our English summer. *Calan Mai*, the calend of May; May the 1st. *Calan gauaf*, the calend of winter; November 1. *Calan Jonauf*, the calend of January; January 1, &c.; all Roman relics. The term *Hâv*, conveys no idea of æstiveness, but rather mildness. *Dyn hafaid*, a mild, placid man. It seems that the primary division of the year was only into two parts: *Hâv*, summer; and *Gauaf*, the reverse of summer, or winter; hence *Hâv tan Galan, a gauaf hyd Wyl Jevan*;—i. e. summer till January, and winter till mid-June.

3. *Hydref*, corresponding with Autumn, implies the ingathering, or harvest season; and is now applied more particularly to the month of October. "*Mae hi yn Hydref gwyllt arno*;" it is all bustle with him. A substitute for the term *Hydref*, applied to the quarter, in many places, is *Cynhauaf*, harvest quarter; literally the precursor of winter. The *Hydref* season commences with "*awst, y bladur ar y trawst*;" i. e.

"Lammas-

“Lammas-day, throw the scythe away.” This implies that formerly hay only was mown with scythes; and that all kinds of corn were cut with reaping hooks. This is in fact the case in many parts still.

4. *Gauav*, the reverse of summer, or *Háv*, commences with *Calan Gauav* (Nov. 1), the calend of winter. Its three months are, 1. *Tachwedd*, the misty; 2. *Rhagoyr*, the short dayed; and *Jonaur*, according to W. O. the radical or commencing month; according to others, derived from the Roman *Januarius*. The usual name of the latter month in some places, and by which only it is known, is *mis du*, or black month: and vulgar errors include in their catalogue among others, that in this month rabbits do not couple, and that indigo will not dye blue.

*Signs of alteration of Weather.*—The numerous list of signs observed in the heavenly bodies, in birds, beasts, insects, vegetables, and inanimate motionless matter, given by the editor of the Shepherd of Banbury’s Observations, &c. coincide in general with the observations of the rustic philosophers of Wales: indeed such as are deducible from natural principles, must be every where the same; under similar circumstances.

*Rainbow.*—In Welsh, “*Enfys y boreu, brith gawodau*”—“If a rainbow be seen in the morning, small rain will follow: if at noon, settled and heavy rains.”—*Sheph. Banb.*

*Colour of Sun, Moon, &c.*—The redness of the sky, sun, &c. in the morning, was proverbially deemed a sign of rain, in Judæa as well as in the British isles.

The redness and other tinges of the new moon, are thus made predictive of the weather to follow, by W. Cynwal, a bard of the 16th century.

*" Gwiliad bawb, bob gwlad y boch,  
Y lloer las y llawr a wlych;  
Llawer o'r gwyni yw'r lloer goch;  
Y lloer wen yw'r seren sych."*

Observe, ye swains, where'er ye stand,  
The pale-blue moon will drench the land;  
Cynthia red, portends much wind;  
When fair—the weather fair you'll find.

A *wet*, or *dry* moon is as common an expression as a wet or dry day; and peasants pretend to foretell whether a new moon will prove *sharp* and *dry*, or *mild* and *moist*, by the position of its horns; not considering that the angle formed by Dian's horns with the plane of the horizon, depends upon the relative position of the sun only.

*Winds* from the *south*, that is, from the sun; and from the south-west, over the Atlantic, are generally attended with mildness, or heat, according to the time of the year; and commonly with rain, unless the weather be settled dry.

*Winds* from the *west*, are frequently boisterous, and driving the heaviest showers of rain. The higher winds are commonly dry, and rain follows. From the *west* to the north, they are more dry, but colder, and that in proportion to their approaching the east. From the east come the most cutting winds, frequently with long droughts and blights in late springs. When rain, sleet, or snow, commence from the quarters of the east, they continue sometimes twenty-four hours and more; and the heaviest falls of snow are generally from that coast.

Peasants inhabiting a situation between two cataracts, or even falls of water over mill-dams, one to the south, the other to the east, upon silent weather in winter,  
judge



judge of approaching frost or thaw. If the eastern water roars, and the southern seems silent, frost follows; if the reverse, thaw: bells and forge-hammers, in similar positions, also predict changes in the air; or rather certify that some change has already taken place.

*Mists or Fogs.*—Observations upon these exhalations are made to much greater advantage in mountainous than in level countries. Mists add much occasionally to the beauty as well as grandeur of alpine scenery; to that of the craggy eminences of the Snowdon Range, in Caernarvonshire, particularly. By these, almost a certainty of rain in the course of the day may at times be predicted; though the morning be fair, and the sky cloudless. Frequently, in a summer's morning, the mist covers the hollows or intermediate spaces completely; and the lofty peaks seem to rise as so many islands out of an ocean. If the mist lies flat, apparently motionless, and gradually diminishing, it is a sign of a fair day; and the peasant hastens to spread his hay, or harvest his corn: if, on the contrary, the mist be observed to be dismembered into shagged and shapeless masses; those ascending, and hovering on the flanks of the mountains, and finally gaining the summits; the peasant carries as speedily as possible what hay or corn he may have in readiness; for he sees plainly that rain is brewing in the air; which generally falls in the course of the day, and commonly about noon.

In the Vale of Glamorgan we heard the following ploughboy's song (*rans des vaches*) predictive of immediate rain, from the clouds resting on the summit of *Morgeiliau*, a lofty mountain in the parish of Llan-gynwyd, in the coal-tract.

<sup>a</sup> *Pan*

*"Pan welir pen Morgeiliau  
Yn gwisgo ei chllg y boreu,  
Odid vawr cyn hanner dydd,  
Ceir ar ei grudd hi ddagrau."*

Morgeiliau's head, when it doth hide  
In morning cap, we have our fears;  
For ten to one before noon-tide  
Its cheeks be bath'd in pleuteous tears.

From the flatter parts of the Vale, *Penlline Castle* becomes the peasant's barometer (see *Grosce's Antiquities*, Vol. II. p. 90).

*"Pan glywir y môr yn crochlefaia yn fin,  
Ar cwmwl yn dew am ben Castell Pen Llin;  
Os gwir y ddiareb, mac cawod o wlaui,  
Yn magu'r yr wybren, a'i syrthiad gerllau."*

When the hoarse waves of Severn are screaming aloud,  
And *Penlline's* lofty castle's involv'd in a cloud;  
If true the old proverb, a shower of rain  
Is brooding above, and will soon drench the plain.

*E. W.'s Poems*, Vol. I. p. 117.

*Preselly* mountain, in *Pembrokeshire*, serves as a beacon for mariners; "and from its summit may be scene all *Pembrokeshire*, and parts of nine other sheeres. This mountaine is so high (1754 feet by Col. Mudge) and far mounted into the ayre, that when the cuntrye about is faire and cleere, the toppe thereof will be hidden in a cloude; which of the inhabitants is taken a sure signe of raine to follow shortly: whercof grewe this proverbe:"

"When *Preselly* weareth a hat,  
All *Pembrokeshire* shall weete of that."—G. O.

The

The common opinion of misty weather prevailing in each of the four seasons is thus expressed :

“ *Niwl gauwr gwasarn eira ;  
Niwl gwanwyn gwasarn gwynt ;  
Niwl har gwasarn lls ;  
Niwl hydref gwasarn gwlaw.*”  
“ *Winter mists will fall in snow ;  
In Spring, the winds will strongly blow ;  
Summer fogs foretell much heat ;  
Autumn inists will rains repeat.*”

In latter times, superstition predicted what would follow, by the weather on some particular festival ; especially on the eve of St. Paul's (Jan. 25).

“ *Os hindda, byd da i'n tir—Nos gwyl Bowl ;  
Os gwlgb iawn, drud brynir ;  
Os gwynt, rhyfel a welir ;  
Os niwl, haint, gresynol, hir.*”  
*Edmun' Prys. 1600.*

This digression upon weather, and the signs thereof, may be the more excuseable, as no set of men have so much depending upon weather as farmers ; not even excepting the weather-glass makers.



#### SECT. IV.—SOIL AND SURFACE,

As the several characteristics of soil are generally derived from those of their respective substrata, from which they were either originally, or subsequently and gradually formed ; the most satisfactory method of distin-



distinguishing soils will be by first describing the several substrata on which they lie.

According to this arrangement, South Wales will be divided into four tracts: *Slate, Red Soil, Limestone, and Coal.*

### 1. *The Slate Tract,*

Obtrudes itself first upon our notice; for though it is not the most valuable or productive, yet is it by far the most extensive, as will appear by reference to the coloured map hereto annexed: it is, moreover, the foundation of the other tracts, which come on in succession as we proceed southward; lying *under* them, and resting *upon* the primitive and unstratified rocks and mountains of North Wales; so that it may be said in this respect, that South Wales is lying or resting *upon* North Wales. This tract is so extensive, that it may be traced, with very trivial interruption, from sea to sea, across the whole Principality, from Conway on the Irish Sea, north, to St. David's Head on St. George's Channel, south. Conway Castle stands upon a blueish slaty rock; from thence the tract crosses the counties of Denbigh and Meirionydd—includes the whole of Montgomeryshire,—all Radnorshire excepting a small tract on its eastern corner,—all Cardiganshire excepting a few anomalies of grey mountain rock, marl, and freestone,—that part of Brecknockshire north of a line extending from below the river Edow in Radnorshire, obliquely across the Eppynt hills, to Cwm y Dwr, on the road between Treacastle and Llandovery,—that part of Caermarthenshire north of Cwm y Dwr and of the river Towy,—and that part of Pembrokeshire

brokeshire north of Narberth and Haverfordwest; and finishes its course about Newgall river on St. Bride's Bay; occupying in South Wales a territory of about 2600 square miles, or 1,664,000 acres: Glamorganshire, consisting almost entirely of coal and limestone, is the only county in South Wales that escapes it.

*Varieties.*—The mountains and hills of this tract vary considerably in the texture and quality of their component parts. 1. *Slates* for roofing buildings, of different shades from grey to blue. These generally occupy the western part of the tract. 2. The more useless appendages of the same family, *shale*, *rab*, or *rock*, as it is variously denominated by different writers: this is generally very perishable, crumbling into minute particles by exposure to the sun, air, and especially frost; useless for every rural purpose, except filling of drains, immediately from the quarry. In some places it is sufficiently indurated for flag-stones under cover; and for buildings to be rough-casted or stuccoed on the outside. The more fragile shale is generally very minutely stratified, but is the least regular in its dip or inclination of any known substance. A few yards space will frequently exhibit its dipping towards every point of the compass. Excepting some instances of strong strata in the higher mountains, &c. its dip or inclination generally undulates parallelly with the surface of the country. A stratum by chance is found very much resembling the iron-stone of the coal-tract in every respect excepting weight and value. In fact, it is a very poor iron-stone. Beside these strata of sham iron-stone, the shale tract frequently exhibits oblate rounded balls, of lamina conglomerated formation, exactly similar to the mine-pins of the coal-tract

tract in texture and fracture. Some balls, &c. are in a state of transition into brown ochre or tripoli; others exhibit cracks or crevices, as if over-heated, or rather as if too quickly dried from their humid state. In some quarries the *shale* or *rab* is not so perishable, nor so regularly and minutely stratified; its fracture is more uneven, and its colour generally purplish, or iron-grey. This kind is better for covering roads than the other, which is of different shades of greyish drab colour; but the scrapings of roads covered with this stone are said to be injurious to land, when used in compost manures.

The *anomalous* substances found in this tract are—  
1. Stratified *whin-stone*, or *grey mountain-rock*, of various degrees of hardness and texture. Some rocks affording excellent and well-squared building stone; others, bearing marks of marine exuvizæ, and effervescing with acids, will not stand the weather well. These rocks are generally regular in their line of bearing; running through the shale from N. E. to S. W. Some of them are broad, and constitute ranges of hills, fruitful in mineral veins. The Shropshire range of these species of rocks, including those of Acton Burnell and the Stiperstones, enter Radnorshire, and cross the county south-east of Llandrindod to the river Wye, below the town of Bualt, where they exhibit a prominent feature, and very different outline from that of the neighbouring hills. They afford excellent building stones, of which the houses in Bualt and the bridge over the Wye show good samples.

The same line of rocks appears south-west of the Wye in Brecknockshire; and as it ran in a S. W. direction through the shaly hills of Radnorshire, so it continues its course through the red sandstone of the  
county



county of Brecon. Its progress is through the parish of Crug-cadarn\*, across the valleys of the Honddu and the two Esgair, to the extremity of the parish of Merthyr Cynog, where it terminates, occupying the craggy entrenchment of *Corn-y-Van*. This grey rock, and grey-soil intruder into the red-soil tract, is about a mile and a half broad in the valley of Honddu, from the north of Castle Madoc to Tanerddi-brook, south of Capel-isa.

Another parallel line, and more indurated, of lesser breadth and continuance, runs through the slaty rab of Radnorshire, about twelve miles to the north-west of the former line. It is seen about two miles below Rhaiadr, on the road to Bualt, forming the rugged summit of *Craig y bont*. It cuts through the slate to an unknown depth, dipping considerably to the N. W., on which side the slate lies upon it. It is seen below the road crossing the Wye, near its junction with the Elain, in a ridge†, bidding defiance to the torrents of ages, and preserving its character and direction up the Brecknockshire hills on the S. W. of the Wye. The stratification in some places is irregular, in others regular, so as to produce four-sided columns nine or ten feet long, and from nine to fourteen inches perfectly square, fine grained, sonorous, and cutting glass. This ridge continues across the hundred of Bualt to the banks of the Irvon, and is to be seen to advantage between Llanwrtyd Wells and the church.

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\* "So called, I presume, from the solidity and firm texture of the *salts* in different parts of this parish."—*Jones's Hist. Brecon*, Vol. II. p. 300.

† This ridge across the Wye, has given the adjoining rock the appellation of *Craig y bont*, as it may be used as a bridge when the Wye is low. There is no other *pont* near the spot.

2. About three miles to the S. E. of this whin ledge, a ridge of pudding-stone appears, rising upon the slate or shale. Blocks of breccia are also found in some places on the shale. They are foreign to the tract, and must be brought from a great distance. The breccias consist of heterogeneous varieties; white and dark quartz, chert, and even calcareous stones with figured shells.

The grey mountain rock (*carreg lwyd*), wherever it is found in considerable tracts, in Radnorshire, Cardiganshire, &c. is always covered with a more grateful soil than the blue slate through which it traverses.

3. 4. This shale or slate tract is singular in producing *marl* with limestone, and *freestone* without coal, in the counties of Cardigan, Caermarthen, and Pembroke. E. W.'s observations on these anomalous phenomena, with respect to the probability of their being the accompaniments of latent coal and limestone, will be found in Chap. XIV. Section on *Fuel*.

*Soils of the Slate Tract.*—"The bluer the slate, or shale, the more meagre the soil," excepting the deeper soils of valleys and hollows. The grey mountain rock, and the pale grey shale, are covered with soils more grateful, unless the elevation be too high, or the aspect too bleak. Of the grey mountain rock tract, just described as jutting into the red soil of Brecknockshire, the observation of Mr. Watkins, of Castle Madoc, whose farm lies upon the grey tract, is this: "The grey soil is quicker than the reddish—ripens grain earlier—is better for barley and pease, and worse for wheat and oats."—This comparison may bear, when referred to *strong* red soils; but it is presumed the case would be different, were the grey soil compared with

with the lighter red soil of the Vale of Usk, from Brecon to Crickhowell.

Peat generally occupies the hollows, and sometimes the slopes of mountainous situations. Clay abounds too near the surface in many places, and requires great expense to be rendered in any degree productive; as the great deficiency in the soils of this tract in general, is the absence of the calcareous component of fertile soil; and what renders that deficiency still more deplorable, is the great distance of the major part of this slate tract from any kind of lime; and its materials in general, are bad for forming good roads to convey thereupon any manure.

Here, as in all countries, the longer the course of rivers, and the slower they flow, the richer will be the soil gradually deposited from the finer particles conveyed by the floods of ages. Consequently, the best soils in Radnorshire are along the banks of the Wye, from opposite Llangoed Castle, to the border of Herefordshire; in the valleys of the Somergild, between the two Radnors; of the Lug, at Presteign; and of the Tame, at Knighton: and in some narrow slips in Radnor Upper, along the banks of the Wye, Edow, Elain, Ithon, &c.\* In some places sound loam appears from one foot to six feet deep, whilst the neigh-

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\* Radnor, above the forest, contains much table land with clay close to the surface, hungry and ungrateful in the extreme, which proves the accuracy of a little pamphlet of the Topography of Wales, published in Welsh verse about the year 1720; in which it is said of Radnorshire, "*Cwylleu gwadu, a ychion fyrdd*," i. e. dry hills and wet enclosures. It is strictly true at this day. No county exhibits drier and better hilly sheep-walks, nor wetter and more uncomfortable flat meadows and pastures, than the greater part of Upper Radnor.

barren fields have only a few inches of meagre soil upon clay or rammel.

The portion of Brecknockshire in the slate tract, is the sag-end of the county, a complete Siberia in every circumstance of soil and climate.

In Cardiganshire, the valley of Teivy, where it opens to any degree of expanse; the valleys of Aeron, Ystwyth, and Rheidiol, &c. &c. exhibit soils of varieties of rich loams.

In Caermarthenshire, the Vale of Towy affords an extensive sample of productive soil; and, as may be expected, the nearer its mouth, when clear of marshes and rushes, the better: the banks of the Tawe, from Llaugharne to Whitland and Kilmaenllwyd, exhibit soil of exuberant fertility; though here and there the red soil, running south-westward into Pembrokeshire, must partake of the compliment.

The *western* coasts of the tract, in the counties of Pembroke and Cardigan, have excellent light and early soils, which have for ages been famous for the production of barley, without much, and in some places without any, alternation of crops. Most of these soils are more or less mixed with grey porous field stones, which are known to be very favourable to the growth of corn. Sea vapours, &c. find a receptacle in these stones; and in dry summers, when the drought becomes injurious to crops on other soils, these porous stones retain a perpetual moisture at their basis, which nourishes the roots, whilst their surfaces afford regular warmth to the blades of the growing crops. The pastures also abound with stones, which the farmers will in no wise gather off, saying that they fertilize the soil.



"It is not here only that we find this opinion; it prevails also in many parts of England, and it seems to be of considerable antiquity; for Lord Bacon notices it in his Natural History, thus: "Some very good *husbanders* do suspect that the *gathering up of flints in flinty ground*, and laying them on heaps (which is much used), is no good *husbandry*, for that they would keep the *ground warm*."—*Mr. Hassall's Pembrokeshire*.

"Much has been formerly said of nitre, &c. as the principle of fertility. Nitre certainly has an effect; and whatever generates it in the soil, fertilizes. Covering the ground with straw, or any thing else, so as to exclude the sun, and in a great measure the air, generates nitre: then probably a covering of stones, as far as they extend, has a tendency to produce nitre, and in some degree to fertilize. It would at least be rash to reject an opinion that has prevailed for ages, and that extensively, without further enquiry: and it would be strange, if it should not have something of truth at bottom.

"What is found to be fact on a small scale, will always be so on a larger. In Glamorgan, and several other places, it is usual with many to cover their potatoes before the frosty season, with straw, fern, &c. and the ground thus covered over winter, is found to be, by that means, more fertile the following year, than other parts of the same ground, in every other respect equal. Sites of old buildings are known to be permanently fertile, so that crops always lodge upon them."—*E. W.*

The slopes or sides of hills, near their basis, where the declivity is not too rapid to have retained the principles of fecundity, and in a south aspect, have frequently



quently a soil more productive under tillage, than the flats of the adjoining valleys: pease grown thereon generally boil well; wheat and barley afford some of the best samples.

The subterranean products of this tract, are slates for roofing, tomb-stones, flag-stones, some freestone, marl, black chalk, copper ore, black jack or sulphate of zinc, and much lead ore, some rich in silver.

## II. *Red Soil Tract.*

This enters South Wales from the counties of Salop, Hereford, and Monmouth. In the county of Salop, where it joins Radnorshire, there is a brook called *Cochen*, or *The Red*; and another brook dividing the two counties, is called *Rhuddog*, or *The Ruddy*; and both so called from their water, after hard rain, being tinged with the colour of the soil through which they flow. This red soil seems here to have been interrupted in its usual progress to the S. W. by the pre-occupation of an extensive mass of grey mountain rock, shale, and some freestone, of the height of 2163 feet, running north and south, and called Radnor Forest\*;

so

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\* "North and north-west of Old Radnor, lie the range of hills called *Radnor Forest*, and its adjoining mountains. The Vale of Radnor, beneath this range, is incumbent on a bed of porous gravel, washed down from the westward; which bed is intersected in stripes by two or three beds of retentive clay. The Forest, and its adjoining hills, are all composed at their base of an argillaceous schistus, containing also silex and calcareous matter. The rock is disposed in beds, dipping to the east; and by exposure to the atmosphere, it rapidly decomposes, and forms a fertile soil, well adapted to both grain and grass: and it is to this circumstance that the fertility of the land east of this range is owing. In ascending the Forest, the rock becomes gradually more siliceous: until at length, near the summit, it is composed of a hard gritty freestone, which

so that it does not obtain any permanent footing in Radnorshire, any further north than the hundred of Pains Castle, below the river Edow. From thence its *northern* limit, crossing the Wye, proceeds over the Eppynt hills in Brecknockshire, north of Llangynog Chapel, to Cwm y Dwr on the borders of Caermarthenshire, before noticed as the boundary spot of the shale tract.

The *southern* limit of the red soil follows the limestone from Llanelly, south of the Usk near Crickhowell, to the Black Mountains in Caermarthenshire, opposite to Cwm y Dwr. The breadth of this tract, at the eastern boundary or base, from Pains Castle in Radnorshire on the north, to Tarren y Kiliau lime-rocks, south of Crickhowell, is about 20 miles; from Llangynog Chapel, across the Vale of Usk, near Brecon, to Glyn Collwyn, about 19 miles; from Cwm y Dwr to the lime-rocks near Capel Callwen, not much above seven miles, an instance of rapid decline. By observing the former extent of this tract on the east, the rich-

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which lies in broken disjointed masses, and of which a quarry has been opened and worked above New Radnor.

On the other side of the Vale of Radnor, opposite the Forest range, lie several masses of rocks of very different compositions from the generality of rocks in the county, as well as from each other. These are, 1. Old Radnor limestone, containing numerous oyster shells; and adjoining it on the east are extensive masses of pudding-stone, or pebbles imbedded in a ferruginous silex. These latter rest upon a bed of what is properly green-stone (not what is called so provincially), and to the eastward is a considerable range of green-stone rock, called *Stanner*, supposed to contain copper. South of the lime rock is another mass of unstratified rock, called *Hanter*, of the granite species: it contains at least so much mica, that its glittering particles were mistaken for some metallic ore, and some money was expended a few years back in working the rock to obtain it."—*T. Frankland Lewis, Esq.*

ness of its valleys, the lofty stateliness of its mountains, and its subsequent sudden decline, a moralizing geologist might draw a simile on the evanescence of human grandeur; on monarchy expelled from their thrones, and driven to obscurity and want.

The red tract we are here describing, once in possession of a triangular territory of about 400 square miles within this district, and occupying by far the loftiest mountains in South Wales, is now reduced to a narrow strip of land; kept from the Vale of Towy, on the north, by the slate tract, and from the mountains on the south by limestone. As if ashamed of such a sudden reverse, near Llandeibie on the south of Llandeilo, it seems as if seeking disguise, in assuming the appearance of chert; and, a submission it would have disdained, when, from its lofty thrones, the Beacons and the Vans of two counties, it domineered over the humbler limestone below,—now humbled in its turn,—it intermingles with alternate layers of crumbly shale; and, as it were, courting concealment, dips with rapidity under the limestone. Recovering a little from this disarrangement, it appears here and there, on its progress south-westward, towards Llandefaclog and Kidwelly, and makes a noble stand in a red sandstone rock veined with white spar, bordering on Caermarthen Bay, at the Castle of Llaugharne. To the south-west of Kidwelly and the Towy, as if to prove its origin superior to that of shale, it makes its presence, wherever it appears, grateful to the farmer, in affording excellent soil both for tillage and pasture. Its last appearance is in some red sandstone quarries near St. David's, where it bids adieu to Wales and to Britain.

The writer of this article once thought that *shale*, owing to its fragile quality, and the irregular eccentricity

tricity of its stratification, was only a rider of secondary formation deposited in a vacant expanse between the strong slate rocks on the north, and the red sandstone mountains on the south; but the circumstance of shale regularly dipping under the red sandstone at Cwm y Dwr, before noticed, proves the prior existence of the under strata or shale.

The reduction of the red-soil tract from a breadth of twenty miles to a mere nothing; of its neighbouring limestone range of several miles breadth to a point; and a strikingly similar reduction of coal, from a breadth of twenty-three miles west of Merthyr Tudful to about three miles in the extremity of Pembrokeshire; all regular in their line of bearing, and as regular in their decline of breadth; are circumstances that militate strongly against a received opinion, that mineral tracts proceed in regular zones around the globe. It is a pretty little theory upon a grand scale; but it must be given up, unless it can be proved by observation, that these mineral girdles contract and expand alternately in their progress round the earth; as bellies of lead ore in pipe veins do, upon a smaller scale.

The *anomalies* of this red-soil tract are very few. Its rocks seldom admit of any foreign admixtures. The Brianog Mountain, near Orickhowell, is said to contain a stratum of compact greyish freestone, whereof furnace hearth-stones, rollers, sextons, &c. are made, and also a bed of inferior sandy limestone. Its mountains are the highest in South Wales, as will appear by a comparative view in the sequel of this Section; and are mostly covered with vegetation, excepting only in such places as are perpendicularly steep. On such declivities, the regularity of stratification exhibits the most stupendous and grand masonry imaginable. The best

specimens of such natural mural fortifications are to be seen in the Skyryd Vawr, the Sugar-Loaf, the Brianog, Cwm Jou, and most of the rocks in the neighbourhood of Crickhowell and Abergavenny. The identity of strata in two or more rocks, about 1800 feet high, a mile or more asunder, and separated by a deep valley, is easily recognized: a mineralogist in quest of fossils should never ascend them, but an admirer of vast expanse, and distant prospects, might be gratified.

*Varieties.*—Though the rocks of this tract exhibit few or no anomalies, they have nevertheless three *varieties* or families—the lower, the middle, and the upper strata;—to be traced to advantage in following the course of the Sawdde brook, from Llangadoc to Pont y Llechau, north of the Black Mountains in Caermarthen-shire. The stone of the lower strata is of a greyish blue colour, of a hard splintery fracture, and exhibiting no particles of sand or mica. Though difficult to be dressed, it makes excellent building stone: the arch of the bridge over the Towy, near Llandovery, is made of it. The middle strata consist of micaceous schistus: the thinner sort are converted into roofing tiles, and those from two to six inches thickness into flags, mile-stones, &c. The interior of the tile or flag is a compact sandstone, of varieties of colours, some brown, some greenish, and others grey. What occasions the cleft, some half, some an inch, and others several inches distance from each other, is a thickly bespangled bed of mica. Wherever this bed of mica occurs, there is a cleft practicable, and in no other part: the transverse fracture exhibits no mica. Mile-stones on the Llanbedr (Lampeter!) road, are from these micaceous quarries at Pont y Llechau. The micaceous pennant-stone of the coal tract,



tract, and the fire-stone of Bettws in the red soil tract on the northern border of Radnorshire, are of this family. The upper strata consist of simple reddish sandstone, convertible to a few uses: it has, however, contributed to the colouring of the soil of the whole of this tract. The two lower families of these rocks, in their progress westward from the Black Mountains in Caermarthenshire, seem to have sunk so deep as to be lost all at once. The upper strata of the red sandstone only appear afterwards, and those faintly and irregularly.

*Soils of the Red Tract.*—The soil of this tract is universally tinged of a more or less red colour; which it communicates to water after every hard shower of rain, without apparently diminishing its own dyeing principle. On the boundary of this tract, where it is divided by that of the grey soil, as herein-before described, intersecting the Valley of Honddu, &c., the properties of the different soils adjoining each other, are apparent in the colour of the water flowing on each side of a road after a hard shower of rain. On one side of the road the water is turbid, and of a dingy drab colour; on the other side it exhibits a compound, like that of a mixture of blood and milk.

The Wye and the Usk are the principal rivers of this tract. The Usk and most of its contributories rise in the red tract, and consequently all brought the same materials to form the soil of the Vale of Usk. These materials were from red sandstone; hence its character is being of too light a texture. It is notwithstanding grateful; and with the good husbandry gradually introduced, by means of the early institution of the Brecon Agricultural Society, it produces excellent crops of grain;

grain; its greatest deficiency being in meadow land. Some dry summers, it is said, have reduced the scanty crops of hay, in some places, to half a ton from three acres well preserved in spring.

The lightness of soil of this Vale occasioned an alarming effect, from the depredations of the pupæ of the cock-chaffer\* in the wheat crops of the year 1810. The crops of the lighter soils about Crickhowell, &c. suffered most. About Abergavenny the soil was too dense for the operation of the insects; and above the town of Brecon their progress was not considerable: the intermediate space seems to have been their scene of action. A gentleman farmer on the spot, wrote and published a pamphlet on the subject; wherein he recommended to his neighbours, among other preventives, the trouble of collecting them by following the plough. His advice was not generally followed, but he himself procured the collection of three bushels and a half, of 40 quarts each, from a piece of four acres. In the spring of 1811, parochial meetings were convened, to consult about the most effectual method of arresting their future progress; but before the opening of another campaign, the enemy fortunately decamped. They, however, appear every season, in detached parties, in soils favourable to their lodgement; in dry sandy soils, in light soils on the white limestone, and on the ferny soils in the slate and shale tract, &c. Rooks are always at war with them: wherever these auxiliaries of the farmer are found to stock up the sward of old pastures on dry soils, it is a pretty certain indication of the existence of these insects under the sod. A writer in the *Agricultural Magazine* (vol. vii. 172) relates how his turnip

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\* Sod-worm of Marshall—*Grillo-talpa* of naturalists.

crop,

crop, even after the second hoeing, was attacked and much injured by the ravages of these puny race of miners; and how it was saved by the timely interposition of a band of rooks. Mr. Marshall, in his Western Survey, says that they are not found north of the Thames. It is certain, that during their period of inhumation, they cannot wade through a much lesser river; but their parents had wings, and might have deposited their offspring in any appropriate soil, to the south or to the north of the Thames or the Tweed; though it is probable they cannot endure a too northern climate.

The soils of sideland declivities are generally of a stronger staple, having more argil in their composition, than that of the Vale, and with good tillage produce better crops.

The Wye and its chief contributories flow for many miles through the shale tract; and bring down with them argillaceous components to improve the sandiness of the red tract; hence the superior tenacity and productiveness of the Vale of Wye. The flat part of the hundred of Talgarth, from Savaddan Lake to Aberlyvni, owes its superior quality as a wheat soil to the deposition of a tenacious sediment, generally foreign to the tract, left by a primitive flood or deluge.

The hilly parts of this tract are far superior to those of the shale tract. Kempy woolled sheep removed from the slate tract into the hilly parts of this tract, will in a few years get rid of their kemps, and *vice versa*.

The tract is well supplied with water. Springs occur, capable of turning mills near their issue.

From that small portion of this tract on the south of the Towy in Caermarthenshire, barley is in much request



quest for seed into the opposite or slaty tract of the Vale.

Vulgar opinion says, that adders, &c. are not so common on this tract as on others of different soils. This may have originated from the Romist legend of the sanctity of Skryd Vawr, and its adjacent red soil in the vicinity of Abergavenny. However, there may be something natural in it: sandy soils may not be favourable to the motion of reptiles.

The red soil of Castle-Martin in Pembrokeshire, should not be confounded with this: it is entirely distinct; its position reversed, its substratum different; and both are separated by two tracts of limestone and one of coal. The Castle-Martin red soil will be defined hereafter, as an anomaly of that limestone tract.

### III. *Limestone Tract.*

The limestone of South Wales may be considered as consisting of three distinct ranges: Northern, Middle, and Southern; each assuming a very different character in natural history.

1. The *Northern* line cannot strictly be called a range, as it consists only of detached rocks, several miles asunder; but regular in a curved line of bearing from each other. Beginning east in Radnorshire, this line of detached lime-rocks, continued from the counties of Salop and Hereford, first appears in the Nash and Woodside rocks near Presteign. Here are five kilns burning for the use of the country: lime white.

2. The next lime rock is about five miles to the S. W. at Old Radnor. It is about a mile in length, and rests on the western base of a grey argillaceous mountain rock, and that also incumbent on masses of pudding-

puddingstone, which rest on a green serpentine rock called Stanner. Some limestone strata are whitish, and fine grained; others are grey, and of a coarse scaly fracture; and both exhibiting spars, and shells of the oyster kind. Here are 22 kilns for burning lime, which is ponderous, strong and durable as manure, but not equally so for building cement. These kilns, together with those near Presteign, consume annually about 5000 tons of coal brought from the Cleop Hills in Shropshire, the distance of about 20 miles; and consequently lime is an expensive article for the farmers of Radnor Upper. About Rhaiadr, carriage included, it costs from 18*d.* to 19*d.* per bushel\*, "nominally Winchester, but according to observation, scarcely more than six gallons." Giving less than from 80 to 100 of these small bushels to an acre, according to a farmer's phrase, "is doing nothing;" and by so doing, it will cost him from six to seven guineas an acre.

3. The third deposit of this limestone runs in detached parcels for some miles in length along the north-western base of the red sandstone of the Black Mountains of Talgarth, from Llanigon to Garthedin, near Savaddan Lake. It is about 14 miles to the S. W. of that at Old Radnor. It is a coarse gritty lime, and is used only for the sake of superior convenience. Its north-eastern extremity is distant from coal, which makes it dear. From Garthedin being within a small distance of the grand or middle range of limestone at Llangynydr, this line of detached rocks veres

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\* "At the kilns of Old Radnor, in consequence of the great distance from coal, lime is charged at the high price of 8*d.* per bushel of less than eight gallons, and 10½*d.* per bushel of ten gallons."—*T. F. Lewis, Esq.*

about

about more to the west, and forms a double cordon, one on each side the Vale of Usk. On the north side it appears covering a considerable tract at Llanvilo and Llanddew, north-east of the town of Brecon; and further on at Venni Vach Wood, and other places about two miles west of Brecon. On the south side of the Vale it is found at Aber Cynrig, opposite Llanham-wich, and a mile or two further west at Ffrwd-grech, opposite Brecon.

The late worthy Author of the History of Brecknockshire, procured the analysis of the limestone in the four last-named rocks, and each consisted of the following ingredients and proportions per cent.

	1.	2.	3.	4.
	VenniVach.	Aber-Cynrig.	Ffrwd-grech.	Llanddew.
Carbonate of lime,	75 — 2	77 — 8	91 — 9	96 — 8
Water, .....	— — 3	— — 4	— — 5	— — 3
Sulphate of lime,	— — 43	—	—	—
Residuum, of ar- gill, silex, and oxyd of iron, &c. ....	24 — 0	21 — 57	7 — 17	2 — 9

Numbers 2, 3, and 4, are said to have traces of the sulphuric acid. Numbers 1 and 2, their lime cements in water.

Further westward than Number 1, these detached rocks are not found nearer than about Llandeilo and Dryslwyn Castle, in the Vale of Towy, Caermarthen-shire. Mr. George Owen, in his History of Pembroke-shire, written in the reign of Queen Elizabeth, and published in the second volume of the Cambrian Register, 1799, traces the continuation of this line from Dryslwyn Castle to Clog y Vran, in the parish of Llan-gynia; thence to the source of the river Marlais above  
Ilwyn-

Llwyn-gwaddan; and finally to the vicinity of Clarbston, Bullhook, &c. Trusting to the line of bearing, he gives the names of places where the same limestone might be found to the westward, and ends at Euston, north of the Newgall (Niwgwl) river; which, not far off, flows into St. Bride's Bay. "This limestone (he addeth) burneth into browner lime than that of the other ranges. It is as profitable for the land and building, but not so fair in colour for plaister. It is small and narrow, in many places not above three or our feet broad."

2. *Middle Range of Limestone.*—The line of detached rocks last described, is to be considered only as anomalous, running in a curved line through the shale or slate and the red soil tracts. This second or middle range is of very different character. It commences on the east, in a grand and lofty specimen in the higher strata of the Bloreng, south of Abergavenny. Its bold escarpment on the north side, exhibits its base of regularly stratified red sandstone, and its upper moiety of limestone; and both together making an elevation, according to General Roy, of 1720 feet, the loftiest limestone probably on this range. This limestone has been considered as the mountain or primitive species. It, however, occasionally exhibits some few marine exuvix; and one stratum, on the Clydach, almost an entire mass of corallines. Some of the lower strata are of extraordinary thickness, appearing like primitive rocks in mass. One bed at Clydach is of a more blue colour than the others, and is used, with the Aberthaw lias, for a water-cement. The catarnet of the Clydach rivulet at  
Pwll

**Pwll y Cwm**, is over a ledge of perpendicular rocks ; on the surface, limestone, about 14 yards ; then a bed of about five feet of a heterogeneous quality, difficultly burnt to lime, sandy, and of a magnesian feel ; then beds of several feet depth of laminar schist, still more argillaceous ; then limestone to the puddingstone base, which separates it from the red sandstone below.

The point of bearing of this range, like that of its parallel ranges, is between the south and the west ; of course its escarpments are to the north-west, forming a lofty parapet on the south side of the Vale of Usk, from the Blorenges to the Llangynydr rocks. Westward from thence, it loses much of its independent boldness, by resting on the base of the loftier red sandstone of the Brecknock Beacons. In passing through the parishes of Penderyn and Ystrad-gynlas, it occasionally departs from its usual regularity of stratification. At Craig Dinas it exhibits the apparent effects of a vast internal convulsion ; the whole mass of the rock being, as it were, thrown southward from its kindred strata on the north, several hundred yards into the coal-measures, and in some places appears to be intermingled with them, in all the irregularity of stratification that fancy can paint. Between the Neath and the Tawy, at Penwyll, the strata recover their regularity of bearing and inclination. It is however of short continuance. North-west of the Tawy, a mile or two above the head of the Swansea Canal, at Hen-Nenadd, the cone-shaped *Cribarth* rears its lofty summit. It seems to have been thrown further than the neighbouring regularly stratified limestone, into the verge of the coal-measures. Its stratification gives an idea of a lofty Tower of Babel tumbled in, topsy-turvy ; though without

without forming a crater at the apex. About the centre of the rock is a bed of freestone, with limestone both above and below. It appears to be the freestone of the coal-measures, but rendered useless by the secondary power which placed it there, being full of fissures in all directions. Here is a vein of red, fine, viscid clay, which probably might be useful in the arts; and fibrous spars, similar, according to Mr. Kirwan's description, to the specimen Leske, O, 1435. "Its fracture fibrous, with slender acicular concretions, standing in different directions."

From the north of Cribarth rock, the regular strata of limestone proceed westward along the skirts of the red sandstone vans, to Clogau Mawr lime-kilns, to Cerrig Cyunen, Llandebie, Mynydd Mawr, Llangydeyrn, opposite Caermarthen, Mynydd Kyvor, between the two Gwendraeth rivers, under their outlet, and that of the Towy to Llanstephan Castle, south of Llaugharne, under the marsh, taking in Coegen rock up to Pen-dain; but now much more confined in breadth, owing probably to a more sudden dip under the coal. From Pen-dain the range continues to Ludchurch and Mankton, in Pembrokeshire; crosses the eastern Cleddeu to Slebeach, Picton, and Boulston; crosses the western Cleddeu to Haroldston Cliff, south of Haverfordwest, to the cliffs of Galtop on St. Bride's Bay. This range, according to Mr. George Owen's account, before quoted, is in many parts of Pembrokeshire, not above a "stone's cast" in breadth; an instance of great reduction from what it is in the counties of Brecon and Glamorgan; from Penrhiw Calch to Bläen Romney; from Capel Callwen to Cribarth, &c.

The limestones of this range, from three several

I. WALES.]

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rocks

rocks, two being at the extreme boundaries of the county of Brecon, were analyzed at the same time as those of the northern line, already described. The three specimens of this range, produced the following ingredients and proportions per cent.

The peculiarities of this limestone range, are frequent concavities on the surface, occasioned by a depression of the strata; swallows, or streams of water, ingulphed into such hollows; vast caverns, beautifully studded with chrysalis and stalactites, &c.

1. Black rock in Llanelly, near Crickhowell, carbonate of lime 97.0; water 0.4; bitumen 0.5; residuum, consisting of argill, silex, oxyd of iron, and a trace of sulphuric acid, 1.5.

2. Pen-wyll, in the parish of Ystrad Gynlas, carbonate of lime 98.9; water 0.2; bitumen, or a substance of that nature, 0.3; oxyd of iron 0.25; residuum, with a trace of sulphuric acid, 0.27.

3. Ystrad Vellte, at the quarries north of the church, a few miles south-east of Pen-wyll, carbonate of lime 99; water 0.2; bitumen 0.1; residuum, oxyd of iron, and a trace of sulphuric acid 0.27.

Mr. Kirwan (vol. I. p. 81, second edition) says, that "limestone contaminated with other substances more than 15 per cent. is so notably degraded, as scarcely to afford lime." Few theoretic rules are without exception. It appears by the analysis of the Venni Vach limestone, in the northern line of detached rocks, that it consisted of upwards of 24 per cent. of heterogeneous substances; and yet it is burnt with profit by a company, both for manure and water-cement. The same experienced chymist also says, that the contaminations of limestone are rarely less than two or three per cent. Whereas the Ystrad Vellte limestone,  
of



of the middle range, above described, is so purely calcareous, as to contain, exclusive of water, not one per cent. of heterogeneous matter. As to the accuracy of the foregoing analyses, it need only be said, that they were performed by one of the first professed chymists in London.

The high exposure of this range, especially on the northern side, gives the soil a very different character from that of lower limestone tracts. We observed none of the *trifolium repens* (white clover), so natural to limestone soils, on the Cribarth and other similarly elevated rocks: though lower down, in Vaenor and Penderyn, the soil is so congenial to the production of this sweet grass, that after being ploughed for a crop of grain, it spontaneously swards the following year with white clover, so as to produce a crop of hay. However, in such hilly limestone tracts, the soil is commonly too acid, owing to want of depth, and the absorbent quality of the under stratum. Arable land, &c. is too generally confined to small patches between protruding rocks.

The general character of this range of limestone, is being too elevated to expect what may be termed exuberant fertility. One instance, however, occurs of the lowest land in the district lying upon it. This is part of Llaugharne Marsh, in Caermarthenshire. The whole marsh is about 3000 acres, the property of G. P. Watkins, Esq. and Lord de Montalt, and has been long since embanked from the sea. In some parts it is a sandy loam on a substratum of rich clay; in others, a cohesive loam lies on the surface, producing very fine wheat and beans. The natural advantages of this spot are obvious—lowness of situation, richness of soil, convenience of manure, lime adjoining



on one side, and sea-sand on the other; and yet with all these advantages, it was somewhat disgusting to find clover fields like botanic gardens, exhibiting plants, and of course weeds in numberless varieties. It is said of the Vale of Glamorgan, that the fertility of its soil produces the worst weeds in the world—*careless Farmers*. The case may be the same here. See more of this marsh in the Chapter on Tillage, &c.

**3. Southern Range of Limestone.**—As the east described or middle range differs much from the northern, so this southern tract differs much from both. It has an undulating horizontal surface; and extends over the greater part of the Vale or rather Plain of Glamorgan, nearly all Gower, and the hundred of Castle Martin in Pembrokeshire. It is bounded on the south, its whole length of about 140 miles from Penarth Point, near Cardiff, to the western extremity of Skomar Island, south-west of Milford Haven, by the Bristol Channel; and on the north, its whole length, by the coal tract, which separates it from the middle range of limestone. Its breadth, from Llanhary on the coal, to Aberthaw on the coast, &c. is about nine miles; or from Ruperra to Sully, about twelve miles. In Gower, it is fifteen miles long, and about five miles broad. In Pembrokeshire it is about twenty-four miles in length, and about nine miles in breadth.

The limestone of this tract differs from that of the middle range, in being more evidently alluvial; bearing numerous impressions of marine exuviae, petrified shell-fish, vertebrae, &c. &c. The strata generally undulate, like those of the shale tract, with the surface of the plain. It differs also more materially from the limestone of the middle range, in having *four distinct varieties*:

varieties: 1. White limestone; 2. Blue, or flag lias\*; 3. Grey, or rag lias; and 4. Bastard lias. These four species will be described in the following order:

1. The white limestone runs parallel with the coal tract, from the borders of Monmouthshire, near Rupperra, on the east, to St. Bride's Bay in Pembrokeshire, on the west. It is denominated *white*, not from the colour of the stone, which exhibits great number of varieties, in good samples of marble; white, black, black and white, reddish brown, red and white, dove colour, green, &c. but from the superior whiteness of the lime in its efflorescent state, after calcination. This limestone yields the best lime for manure, and white washing, &c.; but is inferior to that of the lias kind for strong cement in building. It occupies by far the greater portion of the tract, as will appear by reference to the Map hereto annexed, where the relative position of each of the four species is duly arranged. It is this species which obtains exclusively in Gower, and in Pembrokeshire, south of the coal tract.

The soil on this limestone is excellent for both the purposes of tillage and pasture; being a brownish marly loam, of good tenacity, in some places; in others, on a few degrees of declivity, light and somewhat sandy; so as occasionally to be damaged by the larvæ of the cock-chaffer. It produces, with good management, plenty of all kinds of grain, and swards naturally with the sweetest grasses. Some rising grounds have an anomalous deposition of huge masses of fine white sandstone on the limestone, such as we have seen on St. Mary Hill, near Cowbridge, on *Cefn y Bryn* in Gower, on *Cefn y Vai*, near Bridge-End,

\* This lias is called *fin* lime, in Dr. Watson's Chem. Ess. Vol. IV. 347, second edition.

and on the northern part of Newton Down. The grasses on these open downs are supereminently fine, and consist chiefly of white trefoil, crested dog's-tail, smooth-stalked poa, sheep-fescue, and the sweet vernal grass. The sheep feeding thereon are noted for fineness of wool and well-flavoured mutton.

This tract of white limestone is extremely cavernous in this district, as well as in its continuation in the Mendip-hills of Somersetshire. These caverns in some places contain quantities of lead ore, some calamine, manganese, and strings of copper. It has several beds of calcareous freestone, at Tythegston, Golden Mile, Sutton, Newton Juxta, Cowbridge, Penlline, Welsh St. Donats, Llantrithyd, and especially on the Taaff, in the parish of St. Fagans, resembling the Portland stone; Tufa freestone at Sully, Cadoxton Juxta Barry, Michaelston le Pit, Sutton, &c. This latter species resembles the Purbeck stone.

The limestone tracts of Gower, in Glamorganshire, and of Castle Martin in Pembrokeshire, are so similarly circumstanced, that their respective soils seem only as counterparts of each other: their excellencies and deficiencies are the same. The soil, where deep, is remarkably fertile; and where shallow, on downs, &c. it produces the sweetest pasture for sheep.

Bro Miskin, of late called the Vale of Ely, in Glamorganshire, lies on the northern boundary of the white limestone tract; and extends along the river Ely from near Hensol eastward, to Penarth harbour. Its soil, in addition to its own natural limestone strong loam, has a due alluvial admixture of fine sandy loam, brought down by water, at some remote period, from the adjoining mountains of the coal tract. It abounds with the sweetest herbage, and yields excellent crops of all sorts of grain.

North

North of the white limestone, on the verge of the coal tract, is a bed, imperfectly stratified, of a calcareous puddingstone: its course is from Ruddry, on the Romney, about seven miles north of Cardiff, to Caerphili Down, and through St. Fagans, Llanhary, Coety, &c. to Cefn Cribwr. Its lime is of a dusky brown colour, bad for mortar, but excellent for manure. At Trecastle, near Llanhary, it is about 54 feet thick, and is bored through, to get at the coal; though the bed of coal rises to the south, and that of puddingstone to the north, jutting over the coal.

Other anomalies of the white limestone tract in Glamorganshire, are, 1. Several oblong lozenge-shaped masses, of some miles square in extent, of different species of the lias limestone, as will be further explained in the sequel. 2. Sandstone ridges, and beds of freestone. 3. A thin bed, about one inch thick, of a flinty stone of a light brown colour, and used by the country people to strike fire from steel; in the New-Forest limestone, in the parish of Llansannwr. 4. The same species, somewhat thicker than No. 3, with varieties of colours like ribband jasper, striking fire from steel; in the white limestone riding the rag, or grey lias, at Cas Newydd, near Bridge-End. 5. The same species as Nos. 3 and 4, of a darker colour, and of a more flinty, or conchoidal fracture, near Merthyr Mawr, the seat of Sir John Nichols, Bart.

In Pembrokeshire, the most striking instance of anomaly in the white limestone, is the intrusion of a red soil tract upon a substratum of rag, of the same colour, more *argillaceous* than the red sandstone substratum of the red soil of Brecknockshire, &c.; and consequently, this red soil of Pembrokeshire, excels that of the Vale of Usk, &c. " This red substratum when thrown up

and exposed to sun and air, becomes friable, and breaks down to a saponaceous substance, not unlike the slate marl found about Sutton in Warwickshire, though inferior to it in quality. The *rab* thus pulverized becomes a component part of the soil, without injuring its quality; and the shovellings of roads composed of this material, when mixed with lime, makes an excellent compost manure. The general thickness of this red loamy soil is from 6 to 14 inches; average about 10 inches\*." This soil is found rather preferable to the adjoining one on limestone, for grass; springs of water are more abundant in it; but for corn, the soil on limestone has the preference. Both the tracts, the limestone and red *rab*, having an easy undulating surface, and being most remote from the mountains, are less affected by rains. For this reason, as well as for the superior quality of the soil, the quantity and success of tillage is greater in Castle Martin hundred than in the other parts of Pembrokeshire: and were it otherwise, the supply of wheat in this county would be rather defective.

The boundary of this red soil tract in Castle Martin, may be defined by drawing a line from Freshwater, east through St. Petrox (Llan-Bedrog) to Shepey islet on the southern entrance into Milford Haven. The tract to the south of the line, about three miles and a half in breadth to St. Gawen's Point, will be all limestone. To the north of the line, from Shepey to Nangle Castle, about one mile and a half in breadth, will be red *rab* soil, diminishing in breadth in its progress eastward. At Nangle the limestone recommences, and the line of partition cuts the islet of Skokam in twain, the southern part being red *rab*stone, and the northern lime-

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\* Mr. Hasall, in Original Report.

stone. This latter limestone includes the islets of Sko-mar and Gresholm, and runs in a line from W. by N. to E. by S. under the town of Pembroke to Carew and Tenby. North of this second limestone is another narrower slip of similar red rab soil, running as a boundary between the limestone and the coal tract.

*Lias* limestone, more commonly known by the name of *Aberthaw* limestone, is in colour of various shades, from azure or sky blue to pale grey; with a few accidental masses of other colours. When burnt into lime it is of a *buff* colour, the characteristic, according to the late Mr. Smeaton, of all limes setting in water. This quality is found to be derived from a certain portion of iron it contains, which being calcined with the calcareous part of the stone, makes it equal if not superior to the mortar made of the pozzolana of volcanic countries mixed with common lime. It is observed by Mr. Kirwan and Dr. Higgins, that if the pozzolana cement be long exposed to the air, it will not harden. The *lias* lime has therefore the superiority: it contains both principles, the ferruginous and calcareous within itself; and hath moreover, the more extensively useful quality of hardening in *air* as well as in *water*. Buildings well made with it, soon become a kind of petrification. However, the quality which constitutes its chiefest excellence as mortar, deteriorates its value as land manure: it is considered inferior for that purpose to white lime, in the proportion of 3 to 5; *i. e.* 30 bushels of white lime is deemed equal to 50 bushels of the *lias* kind; and some say 60.

*Lias* limestone is found in many parts of England; in the counties of Somerset, Gloucester, Warwick, Leicester, &c.; and in those of Flint and Anglesey in North-Wales; but this of Glamorgan, according to Mr. Smeaton,



Smeaton, and indeed according to the long and general experience of ages, is the best hitherto known for water-work mortar, and for building in general; which may be accounted for in this manner. Lias limestone in all parts has a peculiarity of stratification and exterior character, so that a rock of it may be known at a distance. The strata are of various thickness, from a few inches to a few feet; and those commonly separated by a few inches thickness of marly clay. The ferruginous ingredient seems to be concentrated in the interior part of each stratum; the outer sides thereof being more porous, and of a paler colour. In inland places the strata are burnt altogether, the argillaceous as well as the ferruginous calcite. Here, at Aberthaw, or other maritime coasts, the strata tumbled down, within reach of the tides, are broken and rolled about, until they are reduced to rounded pebbles or nodules, from a few ounces to many pounds weight; and these consist only of the nucleus or kernel part, the more useless shell being worn off by the abrasion of the furious tides. These rounded lias pebbles are driven on shore in inexhaustible quantities. This lime is also found exceedingly useful and durable in flooring, in malt-kilns, farm houses, and thrashing floors, where plank are scarce.

The *Blue*, or flag lias, in its name bespeaks its colour, and its use in flooring and tomb-stones, &c. It is situate in the eastern end of the Plain of Glamorgan. Its sea-coast boundary is from the mouth of the river Ely to Sully, about four miles; and, in a transverse line, from the coast inland, or northward to Caerau and Leckwith, on the road from Cardiff to Cowbridge, about five miles. At Sully it is intersected by that branch of the white lime tract which extends from the boundary of the coal tract on the north, and taking  
in

in its course the islets of Sully, Flat-holm and Steep-holm, seems to cross the Channel into Somersetshire, and along the Mendip ridge into Wiltshire. This intersecting tract of white limestone extends from Sully to Barry, about two miles. At Barry the separated part of the blue, or flag lias commences, and continues west about three miles to Porth Kerry. From the shore northward it extends to Bonvilston, on the Cowbridge road, from five to six miles.

At Porth Kerry the grey or rag lias commences, which occupies the sea coast to the west of Dunraven Castle, about 14 miles; and in breadth inland about six miles. Several smaller and detached tracts of this species appear engrafted in the white limestone, as at Cowbridge, Coychurch, Bridge-End; and in the Vale of Miskin, at Pont y Carraid, near Llandaŷ, St. Fagans, St. Bride's super Ely, Peterston, &c.

The *Bastard* lias is a connecting link between the white limestone and the true lias. Its situation is medial as well as its quality. Being slightly tainted with iron, it is better for masonry and worse for mortar than the other lias species: and the reverse is both cases with respect to the white lime. It is found in a tract of the shape of a bow, or a weaver's shuttle, about four miles long and one broad, between Cowbridge and St. Mary Church. There is another tract of it in the parish of Tyddington, west of Ogbourne.

The limestone cliffs on the coast are commonly more than 100 feet deep, which affords opportunities of observing their curious construction and contents. The following particulars are deemed worth mentioning.

The *Blue*, or *flag* lias strata in the cliffs of Penarth and Lavernock, near Cardiff, are incumbent on a bed of unknown depth of a strongly ferruginous and earthy,



earth, slightly effervescing with the stronger acids. In some places it is indurated, but it soon crumbles by exposure to the air. Its principal ingredient is a very fine silex, of a deep red colour, which has been used with success, as tripoli, in polishing marble. In this mass of red earth are found five or six beds of fine gypseous alabaster; from whence the West of England, and the counties up the Severn, Gloucester, Hereford, Worcester, &c. are supplied. It has been tried as a manure, but found worthless in this climate. It powerfully attracts water from the atmosphere, and thence most probably its boasted effects in the more arid climate of America. Some of this alabaster is the finest yet discovered in Britain; scarcely inferior in beautiful whiteness and polish to the statuary marble of Carrara in Italy.

The blue lias and the red earth, by cropping out near Sully, rest obliquely upon the ends of the horizontal strata of the white limestone tract already noticed as passing over the Channel into Somersetshire. Under the white limestone are beds of a siliceous nature, called here porphyry; and under the porphyry is an amorphous mass of freestone, called fire-stone, and bull-rock, which works well, and bears the weather. The horizontal strata of white limestone, and their inferior accompaniments, the porphyry and bull-rock, continue from Sully to Barry; where the second or separated tract of blue lias commences, and covering, as before, the bed of red marl or tripoli. They continue from two to three miles to Porth Kerry, where the grey or rag-lias commences, and continues to form the cliffs of the coast for upwards of 14 miles to Dunraven. For this length of coast the rag-lias monopolizes the whole depth of the cliffs, a hundred feet, more or less,  
above

above the sea, (and how much more below is not known) without any foreign admixtures, save marly interlinings in the joints of the strata. The rag-lias is here at its extreme western point, being cut out by other substances.

About a mile to the west of Dunraven Castle, where the cliff is diminishing into a sandbank plain, the lowest substance that could be observed at high water (Oct. 16th, 1811), was primitive limestone in mass, having no strata, but cracks in all directions—coarse, scaly fracture. 2. Above this, a thick bed of limestone, coarse grained, but less indurated than No. 1. 3. Limestone, the same as No. 2; all dipping considerably to the S.E. 4. Puddingstone, of rounded quartz in a cement apparently calcareous; but before this bed dips below the sea, it falls a stratum lower, and at once, at a transverse joint, occupies thenceforward the place of the limestone No. 3, which is no more seen. 5. Puddingstone, same as No. 4. To the west of the transverse joint just noticed there are only two beds of puddingstone; to the east of it, there are three beds. 6. Upon these puddingstones are several beds of different kinds of freestone; some exceedingly fine, and some of the Purbeck kind.

Above all these, rides the rag-lias, from 60 to 100 strata of various thickness; with marly illinations in every joint, from 6 to 18 inches thick. Owing to the rapidity of the dip of the under strata just described, they soon dive under water, and the rag-lias alone reigns monarch of the lofty cliff eastward to the gully at the western gate leading to the Castle. Here its strata become horizontal for a short space, until they are disarranged, and thrown into the utmost confusion by the pre-occupation of a mass of amorphous primitive

tive limestone, which occupies the whole of the promontory south-west of the Castle. This mass is studied on its surface, in some parts, with pieces of dull, blackish, and opaque garnets, some amorphous and others cubic; and the whole forming a nucleus to superincumbent conglomerate strata of limestone, nearly if not equally primitive as itself. Having passed this promontory, the rag-lias pursues its progress, undisturbed, but with various indulations, towards the east.

The foregoing stratifications at the western and eastern extremities of the lias tract, will be better understood by reference to *Plate I. fig. 1 and 2.*

There is something curious in the history of the isolated rag-lias tract near Bridge-End. Its most prominent feature, in a bold escarpment, faces Mr. Dare's Woollen Manufactory; where it appears to dip precipitately to the S. E. under the church of Cas Newydd, and the ruins of the Castle. At the summit it is surmounted by white limestone, which is burnt there in a kiln for manure. Under the whole mass of white and lias limestone is found a bed of rounded lias pebbles, similar to those upon the sea coast, at Aberthaw, &c. which extends northwards as far as the Vornwg, where the bed is interrupted by the millstone strata verging upon the coal tract. The stratification and inclination of the rag-lias are regular where it has no superincumbent strata; but under the white limestone, it is all confusion. Where the strata have approached so near the vertical position as to incline 70 or 80 degrees, some of them appear as if they had actually tumbled over. This tract extends westward about four miles: Lallaston stands upon it.

In the grey or rag-lias, and in the bastard lias tracts, are found beds of siliceous freestone, and other kinds  
of

Fig. 3.

Fig. 2.





7  
2  
7  
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of sandstone. The quantities are not great, excepting on the boundary of the coal tract, as at Bridge-End, Coety, Pyle, &c.

In the stone of the lias tracts, besides the usual marine petrifications of the white lime tract, are also found arboreous, vegetable, and land animal petrifications. The difference in the accidental contents, if such they may be called, found in these two species of limestone; one having calcareous, the other siliceous freestone—one having metallic ores, the other none;—one being under coal, the other never;—one having marine petrifications and marine only; the other adding to those, some land animal, and some vegetable;—and both species of limestone intermingled in separate patches in the same level plain;—seems to be a difficulty calculated to exercise the talents of the Buffoons of Philosophy.

The lias tracts make no further progress westward than about half a mile to the west of Dunraven, and about half a mile to the west of Lallaston. Gower, therefore, is entirely devoid of it, being all composed of white limestone. The same is understood of Castle Martin in Pembrokeshire; though the colour, texture, and fracture of the limestone whereof the eastern front of Stackpole Court is built, resemble those of true lias; and though the stratification of the sea cliffs about the rocks called the Castles, has imitations of marly clay of several inches thickness in every joint; yet as the limestone having these exterior characteristics of true lias is said to burn to very white lime, it cannot be sufficiently ferruginous to produce a cement in water.

“The Chinese sounding stone, called Hion Ché (*calcophonos Plinii*) is reported by the Duke de Chaulnes to consist of calcareous earth, bitumen, and iron.”

Kirwan



Kirwan Vol. I. 114. There is a cubic block of limestone, about 18 inches to a side, called St. Gawen's Bell, near the ruinous Chapel of that name, in Castle Martin: on being struck with another stone it gives a metallic sound; and if that sound is to be attributed to a considerable portion of iron in the composition of the stone, may it not lead to a further suspicion that Castle Martin is not devoid of lias limestone; or such as will yield lime cementing in water? But this is a matter of no great interest to Pembrokeshire, as the lias stone of Aberthaw in Glamorganshire may be procured in any quantities at a small expense, by water-carriage. On the coast of Castle Martin, the cliffs are remarkably grand and extremely picturesque in their stratification; especially about the Castles, and opposite the Crowstone rock. Some rocks about 90 feet high, about from five to seven yards square, are isolated by the sea; and in the summer season covered by *eligugs*, a singular species of migratory birds, supposed by zoologists to be the same as the puffins of Priest-holm islet in North Wales. In some places the stratification of the cliffs forms arches of very regular construction, which afford passages for the tides into vast inland caverns of tremendous depth when viewed from above. A sketch of the stratification of one of these curious cliffs, near Crowstone, is to be seen *Plate I. fig. 3.*

The *soils* upon the three species of lias limestone are as distinguishable from each other as their respective substrata. The soil upon the blue or flag-lias, is a raven-grey loam from five to eight inches, seldom a foot depth, upon a strong clayey subsoil, too cohesive to permit the percolation of rain or other water, which in flats and hollows lodges on or near the surface, and produces carnation grass, dyer's broom, and other  
grasses

grasses natural to such soils. The surface soils bind and crack in dry summers; but on being moistened by rain, they quickly become prolific in grass. Large cattle are reared upon this soil; they thrive well, and fatten equally so, when of proper age. It is not favourable for sheep in winter; but brought upon it, from other parts, in the drier seasons of the year, they fatten rapidly.

The rag or grey lias tracts have a soil nearly a-kin to the foregoing. Indeed, it is only a medial link between it and the bastard lias: and the latter holds the same medial properties between the rag-lias and the white limestone. Less tenacity in the soil, and more frequent crevices in the white limestone, give it the property of quickly disposing of surface moisture, and of being a more free working soil; but less capable of bearing a long course of tillage, or of producing a luxuriance of herbage. It is therefore easy to discover that the bastard lias has a stronger soil, and consequently a greater share of moisture, springs, and brooks, than the white limestone; but less so than the two other species of more perfect lias. The subsoil of the lias species, more or less, according to their various gradations, effervesces with strong vinegar; and yet the farmers, in general, when the surface soil is not of sufficient depth to bear constant cropping, will not be persuaded to plough deeper, and bring up this marly subsoil. They say the crop following will not be so good. If they quit their farms the first or second year after deep ploughing, it might be prudent in them not to alter the staple; but if they have leases, or a prospect of continuing a few years longer, this strong marly subsoil ploughed up, improved by the sun, air, and frost; incorporated with the thin, harassed, top

s. WARE.]                      F                      soil,



soil, and properly managed and manured, would, it is presumed, make a considerable alteration in the value of the land; and, ultimately, in the profits of the farmer. It need not be added, that the stronger soils upon lias are excellently adapted to the growth of wheat, beans, oats, and cabbages; and the lighter soils, in addition to the foregoing, for the cultivation of barley, pease, turnips, sainfoin, &c.

#### IV. *Coal Tract.*

The wisdom, as well as the power, of the Creator, is evident in all his works. The richest soils seldom produce any great quantities of valuable minerals; and wherever minerals are profusely bestowed, there is, generally, a natural poverty of soil on the surface. The elevation of a country favours the discovery and the working of mines; at the same time it contributes, in conjunction with other causes, to the sterility of the soil; which must be improved, and rendered more fertile, by the industry and skill of man. The *coal tract* of this district is a case in point. It is extensive, elevated, and in the state of nature, comparatively barren. In several respects it is similar to the poor soils of the shale or slate tract, already described. The grasses, shrubs, and woods, of both tracts, are generally of the same kinds: both have clays near the surface, and consequently a similar and poor weepy top-soil. This similarity of exterior appearances has induced many novices in geology to bore and search for coal in the shale or slate tract; where, according to the best system of mineralogy hitherto known, coal is *not* to be found. They may find indurated clays resembling the *bind* and the *clunch* of coal fields; but those clays do not exhibit any vegetable impressions,  
and

and it is very rarely they are in any degree alluminous. They may find a blackish shiver of the appearance of coal; but if it will ignite, it will be owing to sulphur, and not to any species of bitumen, or mineral carbon.

There are two popular opinions respecting coal. One is, that coal fields run in parallel zones round the globe; the other, that coal may every where be found, if we *sink deep enough*. The former seems, as yet, to be an assertion without proof; the latter is however more easily exploded. We may sink, assuming at present an impossibility, to the centre of the earth, out of a coal field, without finding any coal. The coal-measures of South Wales rest upon puddingstone, and other varieties of siliceous strata, which the colliers, very judiciously, call *farewell beds*: *i. e.* *farewell coal*, there is no more to be had here, by sinking deeper. These farewell beds lie upon primitive limestone—that upon the lower puddingstone—that upon a vast depth of red sandstone—that upon many miles of shale and slate, and the latter upon amorphous granitic mountains, the highest and deepest in the Principality. To sink through all these would be a hopeless task; and to expect coal, in beds, between these several varieties of rocks, would be as useless. They have all a general dip or inclination the same way, and of course crop out or basset, to the contrary point. Had coal been among them, some of its hardest accompaniments, if not the coal itself, would have cropt out or bassetted to the surface, in some dingle or other: but this is not the case, neither is it to be expected.

Having premised thus much of coal in general, we shall reserve the description of the substrata, varieties of coal, and their intermediate measures, for the Section on *Fuel*; confining ourselves, in this tract, more strictly to the title of the Section—*Soil and Surface*.

Of the substances accompanying coal, some are more or less sandy, others clayey or argillaceous. All of them crop or basset out to the surface in their turns. The more perishable sandstones, by the action of the elements, and other causes, for ages, have given the adjacent soils a character of dryness; but as the clayey, or argillaceous strata, are greater in number and quantity, so the cold and weepy soils produced by them, so much the more abound. The clayey soil of the coal tract is however more manageable to the farmer than that of the slate tract; which is owing to its being more impregnated with a fine silex, causing it to fall in water, or moulder in the air, more readily. The top-soil, most commonly, consists of a mixture of sand and a black peaty earth, from four to eight inches thick; resting upon a yellowish, blueish, or a light-brown clay, from one to four feet depth, or more: and both compounded together, by a judicious system of tillage, tend evidently to the mutual improvement of each other.

“ The coal tract soil will succeed better in tillage than grass; though the general practice is contrary. “ *Daeir yn gofyn ei thrafod o hyd yw hi;*” i. e. it is a soil that requires frequent stirring.”—*A Llangyfelach Farmer.*

This farmer’s opinion is the more valid, as by putting it in practice upon a small farm, he became enabled to manage a much larger one.

We heard the same opinion elsewhere—“ *Ymae tir y blaenau yn gofyn ei drafod yn fynych, iddei gadw mor ysgawn ag y gellir. Dim hwy yn welltir na blwyddyn am bob cnwd.*” i. e. the soil of the upland coal tract requires frequent tillage, to be kept as light as possible: it should remain no longer in grass than one year for each preceding crop in the course.

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The poor clayey soils of the slate tract are far less improveable than these of the coal tract. The clay in the latter is less stubborn, lime is more convenient; and the spirit of improvement among the occupiers more likely to be awakened, by several successful experiments made by the Lessees of the coal and iron-works. These are, generally, men of science and opulence, habituated to experiments in the pursuit of their professions; and the natural barrenness of the soil, were there no other motive, would compel them to use every effort to improve its produce, in order to support a stock, indispensable in the prosecution of their works.

In the outskirts of the coal tract, lime, its great improver, is at hand; and in the centre of the broadest part of the tract it is not above 12 miles off; but in too many parts the roads are impassable for any heavy carriages: they are however annually improving in some part or other.

The following observations were made by an intelligent improver of the coal tract soil, on the south-western coast of Caermarthenshire:

“ Our climate is very moist about the autumnal equinox; but not so much as represented to prevent the cultivation of wheat. Sow early, before the rain sets in, and then you will reap early. I do so, and few crops equal mine. I have had this year four quarters an acre, the average of the country not being above two quarters. There is too much prejudice against the soil of the coal tract, but without foundation. It will produce excellent corn, where dry; and where wet, drain: then lime abundantly. The water of the coal tract contains vitriolic acid, which poisons the soil, and cause it to produce coarse and sour herbage, devil's bit, scabious, dyer's broom, centaury, carnation grass, &c.

The calcareous alkali, given freely, will neutralize the  
F 3
acid,

acid, and prepare the food of better plants."—*Rev. Mr. Evans.*

"In the coal tract, on the north side of Gower in Glamorganshire, paring and burning the carexy sward is practised, with the addition of a full fallow's lime to the ashes; and four abundant crops have been obtained. On objecting to so many white crops being taken, the farmer's answer was—that by such cropping the peatiness of the soil was more effectually *killed* than if he had been more lenient: the soil became sounder, and in better condition for an alternation of pasturage of four years: then to be fallowed and cropped as before: then four years rest: and so on in perpetual alternation. This, with effectual draining, will in ten or twelve years destroy the peatiness of the soil for ever; especially if care be taken to plough up some of the clayey subsoil, where it is within reach; or to collect sound earth for lime composts in every fallow; and never to burn after the first time. Draining well is of the first importance, and then the white clover will cover the ground like a sheet. Coal ashes is an excellent sward-dressing on such soils, and so is lime."

The whole of the six counties has been already estimated, according to the scale of Smith's Maps, at 4237 square miles; whereof the several tracts already described occupy nearly the following proportions:

Slate and shale, rab, or roch, including some anomalies, .....	} <sup>sq. miles.</sup> 2600
Reddish soil on a red sandstone base, .....	
Limestone in Glamorganshire, .....	400
Limestone in the counties of Brecon, Caermarthen, Pembroke, .....	} 112
Coal tract within the above four counties, .....	
	900

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4237

SECT.

## SECT. V.—MINERALS.

Of metallic ores, in this district, those of *lead* and *iron* are the most abundant: iron in the coal tract, and lead in the slate and white limestone tracts.

“Limestone tracts are generally too dry to contain lead ore; as the ore could not be formed without water.”—*J. M.*

Another *J. M.* (Mr. Middleton, in his *Survey of Middlesex*, p. 26) is of a different opinion. He says—“Lead, copper, silver, and perhaps gold, are usually found in limestone strata. I do not know whether they are ever met with out of it; and suspect this stone of contributing towards their formation.”

Both the above theories are wrong. Silver ore, independent of that of lead, we have none in Britain; neither have we, it is supposed, any lead ore without silver admixture. The lead ores of the grey mountain rock afford considerably more silver than those imbedded in limestone. Both lead and copper have abounded, and may still abound, both *in limestone*, and *out of it*.

In limestone,—*lead ore*, in numerous places in Flintshire and Denbighshire in North Wales; in Glamorganshire South Wales; in Derbyshire, Mendip-hills, &c. in England; the islet of Isla, Bathgate, &c. in Scotland.

In grey mountain rocks, &c.—*lead ore*, in the counties of Caernarvon, Meirionydd, and Montgomery; in above 50 mines in Cardiganshire; in Lord Cawdor's mine at Rhandir y Mwyn, in Caermarthenshire; in the Llanvernach Mountains in Pembrokeshire; at Cwm Elain, Llandrindod, Llandegla, &c. in Radnorshire;

in several places in Yorkshire and Westmoreland; in the Lead Hills, Wanlock Head, Machymore in Galloway, Tyndrum in the Highlands, &c. in Scotland. In *granite* or moorstone,—in Cornwall, Strontian in Scotland, &c.

The greatest *copper* mine in Britain, that of Paris Mountain, is not in limestone. Other inferior copper mines are, some in limestone, and some in rocks of a different genus: so is the sulphat of zinc, or black jack; but calamine, the carbonate of zinc, generally accompanies limestone.

To return to the Minerals of South Wales—Twenty years back it had produced, in value, more *lead* than *iron*; in twenty years to come, the case will be reversed. Therefore, as an agricultural, as well as a commercial and fighting nation, we ought to give *iron* the lead\*. There is no iron *ore*, in the strict sense of the term, that we know of, in the district; but there is iron *stone*, apparently, in inexhaustible abundance, in the coal tract; both in strata, and in oblate nodules, called *balls of mine*, running, with their concomitant measures, the whole extent of the tract. The strata are commonly of small thickness, varying from one to five inches. The balls of mine are of various sizes, from two to sixteen and twenty pounds weight, and upwards, even to three cwt. Both kinds are poorer in metal than the iron *ore* of the north of England, &c. in the proportion of 30 to 70 per cent.: but the contiguity of this iron stone to coal fuel, its extent, and the convenience of procuring it, by mining for coal, and the frequency of dells intersecting the tract in deep hollows, &c. make ample amends for its poverty in metal.

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\* An instance of the obvious necessity of changing the orthography of *lead* (metal) into *ledd*.

The general position of the iron strata in the coal-measures, may be understood by the following extract from the *Cyfarthfa* and *Dowlais* Sections, near Merthyr Tudful.

	<i>Cyfarthfa.</i>	<i>Dowlais.</i>
Number of veins, or beds of ironstone or ball mines, lying between strata of allu- minous schist, called cleft, clunch, &c.	22	46
Ditto between rock and clunch .....	3	8
Ditto between clunch and coal .....	2	
Ditto between clunch and fire clay .....	1	
Ditto between rock and coal .....		1
Ditto between clunch and freestone .....		3
	28	58

The veins of ironstone, and beds of mine-balls, are much more numerous in the lower strata than in the upper strata of the *Cyfarthfa* Section. The whole depth is about 689½ feet. In the upper 516 feet, there are only two veins of ironstone, one four, the other three inches thick; and but four beds of mine-balls, one of two inches, two of three inches, and one of 14 inches; the latter containing balls of three cwt. In this upper division are 18 beds of coal.

In the next 103 feet there are 19 beds of ironstone, pin, and ball mines, alternating with as many strata of clunch, called there blue cleft, without the intervention of any other mineral, excepting two or three instances of hard rock a few feet in thickness. In this division there is no coal.

In the lower 70 feet are three beds of ironstone and pin mine, of two and a half, three, and four inches thickness; all between strata of clunch. In this division are four beds of coal.

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The beds of veinstone and mine-balls vary in thickness from two inches to five and a half inches. One bed of mine-balls occurs of seven inches thickness, and one of 14 inches, before noticed—average thickness four inches—total depth of iron mines, nine feet and a quarter.

The presence of iron in frequent beds, indicates the absence of coal; and *vice versa*. In the Cyfarthfa Section, above described, the upper division has 18 beds of coal, and only six beds of iron mine; the middle division has 10 beds of iron mine without any coal; and the lower division has four beds of coal, and three beds of iron mine.

The Dowlais Section has some similarity of general stratification to that at Cyfarthfa; though the beds of coal and iron mine seem more generally diffused, upon the whole, in the former than in the latter Section: but if the Dowlais Section be more minutely divided into nine classes of strata, the increase of iron in one class, is a sure index of a decrease of coal, and *vice versa*, and that in a regular alternation, as will appear by the following table.

Classes of Strata.	Depth of Class.		Beds of Iron.	Depth of Iron.		Beds of Coal.	Depth of Coal.	
	Ft.	In.		Ft.	In.		Ft.	In.
1st or upper class ..	5	7½	4	0	7½	—	—	—
2d .....	113	0	—	—	—	7	6	4
3d .....	47	2	8	1	4	2	2	1
4th .....	58	7	1	0	4	8	13	0
5th .....	62	2	6	1	1	—	—	—
6th .....	24	3	—	—	—	5	10	11
7th .....	22	7½	11	1	8½	1	2	6
8th .....	130	11	3	1	1	12	20	9
9th .....	138	10½	25	5	3½	2	1	1
	603	2½	58	11	5½	37	66	8

The

The foregoing extracts are inserted here, as illustrative of the position and quantity of iron mines; the entire sections being reserved, among others, for the Chapter on Rural Economy—Section on *Fuel*.

The iron mines of the northern and eastern sides of the mineral basin, are chiefly worked; and those, in any considerable degree, where the accompanying coal is of a coking quality, fit for the blast furnaces. On the southern side of the basin, the ironstone, &c. are equally good, if not superior to those of the northern side; but owing to circumstances, are as yet neglected, excepting at Neath, and a few other places.

The characteristics of this ironstone, agree with those of the 1st variety, 1st family, and 4th tribe of iron ores in Kirwan's Mineralogy—Vol. II. p. 173, 2nd edit.—being by him called *Common upland argillaceous ironstone*.

Some vegetable exuvizæ are found in the argillaceous coal-measures. The late Rev. Mr. Evans, of Llanelly in Caermarthenshire, had in his possession a common hazel nut, apparently bored by a squirrel, and the kernel scooped out, which was found inclosed in a solid rock, 19 fathoms deep; whereof 16 fathoms were above the nut, and three fathoms below, over a bed of coal. Over the rock was a depth of two fathoms of soil and other loose substances; so that the nut was imbedded in a hard rock at the depth of 108 feet from the surface. Mr. Evans put the nut into an empty glass, and in two or three days it crumbled into powder. *Lusus naturæ* are now hissed off the stage. Could Mr. Evans be in an error owing to a *deceptio visûs*? If the hollow shell ever inclosed the kernel of a hazel nut, it proves the diluvian origin of coal.

Lead

2. *Lead ore* claims the second place, in point of profit and national advantage. The red sandstone and coal tracts are devoid of it; though it has been found to a good amount in the other two tracts of white limestone and slate.

Lead ore in the white limestone has been found in several parts of Glamorganshire; in the islets of Flat-holm, Barry, &c. at Llantryddyd, Coychurch, Merthyr Mawr, Newton, Coed Lai, Maen Llwyd, in the parish of Ruddry, about three miles east of Caerphili; but the most remarkable are the three following:

1. *All-Slade Mine*, about a quarter of a mile from the sea-shore, in the parish of Bishopston, in Gower:—The father of a respectable writer and traveller, now living, formerly procured 12,000*l.*, clear profit, from a belly of ore in a pipe vein, at this place. The pipe vein, as usual, closing, he lost all traces of it; but, in a true mining spirit, he pursued his research until he had spent 1000*l.* exclusive of the 12,000*l.* he had once pocketed as clear gain. The mine was re-opened about three years back; several tons of ore were procured, but the work was afterwards relinquished.

2. *Tewgoed Mine*, in the parish of Llanganna, near Cowbridge. Here the grand vein runs nearly east and west through the limestone, and hading to the noon sun. On the south side of the vein is a blueish calcareous earth called *liman*. The vein itself, called the *red vein*, from the colour of its contents, has nodules of lead ore imbedded in it, with a rider of calcareous freestone. Three parallel veins, called *blue veins*, run obliquely from the north-west into this *red vein*. The ore of the blue veins is galena, or the laminar potter's ore. Near the junction of one of the blue veins  
with

with the transverse red vein, a shaft was sunk, and a rich belly of steel-grained ore was discovered. This induced the miners to sink two other shafts near the junction of the other two blue veins with the red vein, and with equal success. This circumstance, as it elucidates a point hereafter to be discussed, respecting the regular bearing of the richer parts of parallel mineral veins, will be further explained by a sketch in *Plate I. fig. 4.*

3. The *Park Mine*, about a mile to the south of Llantrisant, is the property of the Marquis of Bute. It is said that 500 miners, &c. were employed here about 40 years back. The ore is galena, matrix spar, in limestone—bearing of the vein E. and W. This mine being under water, a level was cut *through coal*, under the limestone, to dry it. The peculiarity of this mine, is its being in *limestone over coal*. Only one other instance of coal *under* limestone was noticed in this district, which is at *Pwll Tor y Gelli*, near Treccastle, in the parish of Llanhary; which will be further described in treating of Coal-measures, in the Section on *Fuel*.

As the slate or shale tract is much more extensive than the limestone tract, so are its mines of lead ore much more numerous.

In *Radnorshire*, lead ore is said to have been raised from the remotest times near Llandrindod. The mine was worked so late as the year 1799, but has ever since been neglected.

2. “*Mwyn plwm yn y graig yn Llandegla,*” *i. e.* Lead ore in the rock at Llandegla.—*Letters to Lhuyd*, 1697.—Some faint trials have now and then been made there of late years. Llandegla lies a few miles to the

the north-east of Llandrindod; and to the north-west of the latter place, lies,

3. *Cwm Elain*. Thomas Grove, Esq. bought a mansion-house and estate at this place, and occasionally resided there, for the sake of improvements, and the introduction of the Wiltshire system of the folding husbandry with South Down sheep. About the year 1796, in cutting a drain in a dell between two hills, the workmen crossed a vein of lead ore very near the surface. Mr. Grove worked the mine at his own expense, as long as profits were certain. In a short time his clear gains amounted to 500*l*. The shafts filling with water, and expenses multiplying, reduced his former profits to 200*l*. He then prudently leased the works to a Mining Company. The veins run from N. E. to S. W. The ore is galena, accompanied by blend or sulphat of zinc, quartz, &c. in a mixed matrix of quartz and grey mountain rock. The sides seem to be too imperfectly indurated.

*Brecknockshire* has nearly escaped without any metallic ores; at least very few have hitherto been discovered. Some traces of lead ore have been observed, and trials made, near the Dinas limestone rock, in the parish of Penderin. 2. In the hills of Llanigon, south of the Hay, some veins of lead ore have been discovered some years back, and worked; but the expenses were greater than the profits.

In the slate or shale tract of this county, ores are still fewer. A little sulphat of copper has been discovered near Nant y Car, in the parish of Idanwrthwl, not far from the junction of the rivers Elain and Wye. Some slight trials were made without success.

The only mine of note in *Caermarthenshire*, hitherto discovered, is the lead mine of Lord Cawdor, at

*Rhandir*



*Rhandir y Mwyn*, in the parish of Llanfair ar y Bryn, at the north-eastern extremity of the Vale of Towy. The grand vein runs E. and W. across a hill, whose line of bearing is N. and S. A level enters the west side of the hill, and serves as a canal for small boats to a certain distance, where an ascent of 70 feet commences; and at the top another level is pursued to the eastern side of the hill; the whole measuring somewhat less than a mile.

This mine was opened upwards of 60 years back; and report, some years ago, stated its profits at upwards of 300,000*l*. An old miner, who worked there two years, about 26 years back, informed us that he and three other miners, assisted by three labourers, raised 45 tons of clean ore in three weeks; that about 400 men were then employed; that the average quantity of ore raised, was from 900 to 1200 tons per quarter of three calendar months; and that the Agent at that time was a kind of commissary-general, supplying the workmen with every article of food and apparel, whereby he is said to have amassed a property of about 30,000*l*. The present superintendant is a Cornish miner of the name of Williams. The mine is considered as far from being exhausted, though few miners are employed. Prudence prescribes caution until better times. Time was, when lead ore was four times the value of black jack or blend; now blend sells for 9*l*. and lead ore for no more than 10*l*. per ton.

We have heard, "that considerable quantities of lead ore, rich veins of copper, besides calamine, and manganese, and, in one instance, tin ore, may be found in *Pembrokeshire*;" but *where*, we could not learn, and it is probably a difficult task.

Mr. Raspe, the mineralogist, in his Survey of Wales, about the years 1793 and 1794, in order to form

form a mineralogical chart of its subterranean contents, is said to have given a very unfavourable opinion of the mineral wealth of the greater part of Pembrokeshire. A rich vein of lead ore has, however, been worked in the parish of Llanfernach, in the slaty tract, which is now under water, for want of hydraulic powers, or an expensive level, to drain the mines. A report was lately in circulation, that these mines were to be reopened, and that the river Tawe was to be made navigable from St. Clare's, up to the mines, or near them. Whether an engineer has vouched the practicability of the scheme, we do not know. Though the tract of country through which the Tawe flows appears level, yet it must have many feet fall from Kilmaenllwyd to St. Clare's.

Having perambulated five counties in quest of lead mines, we now come to the sixth; having reserved *Cardiganshire* to the last, as a cornucopia (celebrated for ages for its riches in silver as well as lead), to decorate the conclusion of this Mineral Section.

During conversation with a Cardiganshire gentleman, he observed, "how niggardly Nature had bestowed her blessings upon his native county." We endeavoured to frame an apology for Nature; and, among other instances of her liberality, mentioned the silver and lead mines. "O!" he exclaimed, "that is a curse, and not a blessing: the mines enrich a person or two in an age, and entail poverty on hundreds for generations to come. The waters from the mines," he added, "spread sterility over the adjacent fields, and kill all the fish in the rivers."

However correct this gentleman's remarks may be, some concise sketch of the history of the Cardiganshire mines, which during three centuries have exercised the

pens



pens of proprietors, baronets, miners, historians, tourists, lawyers, and poets\*, may not be deemed uninteresting.

The open and oblong trenches of the Roman miners, and the vertical pits or shafts of the Danes, are recognized by some writers among the Cardiganshire mines. "Many of these veins were opened and worked by the Romans, whose works were remarkable and singular, being all open cast, like a great ditch or gulph. They cut open the vein longitudinally, and formed wide gulphs in the course or bearing of the veins. I saw one of these gulphs at *Darren Vawr* (Cardiganshire), where the fine steel ore was very rich in silver, so large, deep, and long, as to begin on one side, and reach quite through the summit of a considerable mountain; and this vast trench was so deep and wide, as to be about 70 fathoms down below the surface of the ground near the summit of the mountain; but they had worked none in the vein down in the level ground at the foot of the mountain, where I saw very rich modern works under level, upon a regular rib of steel ore, from one foot and a half to three feet wide in different parts of the vein, and remarkably rich in silver†."

But omitting the uncertain processes in mining, made use of by all marauding freebooters in ancient times, whether Romans or Danes, which must be enveloped in obscurity; let us descend to a later period, the records of which may be depended upon, and begin our sketch with the reign of Elizabeth, when metallurgy, and other useful arts, began, in a special

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\* Sir John Pettus, Sir Humphrey Mackworth, Thomas Bushel, Esq. Waller, Yalden, Watson, Malkin, Meyrick, &c.

† Williams's Mineral Kingdom, Vol. I. 411, first edition.

manner, to be noticed and encouraged by that Queen's enlightened ministry.

For the furtherance of arts, in which natives were no great adepts, foreigners were politically introduced, naturalized, and admitted as co-partners with the natives, to conduct the affairs, and to share the profits of different concerns. The genius of hidden treasures, as well as angels of superior orders, smiled propitiously on the commencement of Elizabeth's reign.

In the year 1558, Providence ridded the nation of Mary, her council, bigotry, superstition, and ignorance.

In 1561, the great copper mine, at the foot of Skiddaw, near Keswick, and other mines, were discovered.

In 1563, letters patent were granted to Thomas Thurland and Daniel Houghsetter, two German adventurers and metallurgists, giving them, upon certain terms, all the Mines Royal of gold, silver, copper, and quicksilver, within several specified counties of England, and the Principality of Wales.

In 1565, letters patent were granted, of all the *calamine* in England, and within the English pale in Ireland, to William Humphrey, the Queen's assayer, and Christopher Shutz, who, as the patent sets forth, was a workman of great cunning, knowledge, and experience, as well in the finding of calamine, as in the proper use of it to be mixed with copper for the composition of brass\*.

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\* The discovery and successful working of mines of copper and calamine, in this Queen's reign, enabled her to leave the nation at her death, a greater number of *brass* cannon than she found of those of *iron* at the commencement of her reign.

In 1567, the letters patent of 1563 to Thurland and Houghsetter, became the ground-work of a corporation entitled, "*The Society for the Mines Royal*," within the several districts specified in the patent. It is probable the patentees, not finding the ores every where on the surface, found it convenient, if not necessary, to associate with persons having a greater command of money, &c. than themselves. At the head of this incorporation, were the Earls of Pembroke and Leicester, Lord Mountjoy, &c. in all 24, holding as many shares, subdivisible into four times as many, at the option of the majority. Houghsetter was to act as Deputy-governor under the Earl of Pembroke, and Thurland as First Assistant.

In 1568, another society was incorporated, entitled, "*The Society for the Mineral and Battery Works*," consisting of Sir Nicolas Bacon, Lord Keeper, Duke of Norfolk, Earls of Pembroke and Leicester, Lord Cobham, Sir William Cecil, and others; in all 36, holding as many shares, and subdivisible into four times as many, at the option of the majority. This patent included all England and Wales, and the English pale in Ireland; the mines in the former patent, and copperas and alum already granted to Cornelius Devosse, excepted.

The most eligible of the Cardiganshire mines, were wrought for some length of time, at the joint expense and for the joint profit of the Society for the Mines Royal. It may, however, be presumed, that their profits were nothing extraordinary; as the Society was at length induced to rent the whole of the Mines Royal in Cardiganshire, to Sir Hugh Myddleton, at the low annual rent of 400*l*. His judicious management wrought such a great alteration, that his monthly pro-

fits, from Cwm Symlog mine only, has been estimated at 2000*l*. His expense of coining his silver bullion, extracted from the lead of these rich mines, at a great distance, in the Tower, into crown and angel pieces, of 5*s*. and 10*s*. current value, amounted to a considerable drawback on his gross profits. How long he continued to work the mines with equal assiduity and success, is not perhaps publicly known; probably not later than the year 1608, when he entered upon his great scheme of bringing the New River from the Chadwell and Amwell springs in Hertfordshire, to a reservoir at Islington, and from thence by elm pipes to supply the City of London with water. The princely fortune he had acquired by his abilities in the *fodinas* of Cardiganshire, he too liberally annihilated in the completion of the *fontes* above alluded to\*. His ungrateful cotemporaries ought to have rewarded him, not with a statue, which has too frequently been bestowed on a worthless character, but with a remuneration, of some kind or other, from that public he had so much benefited, at the expense of an entire embarrassment of his own well-earned finances. However, the late and cheap recompense of an "honourable mention of his name," after his death, is all that British gratitude did bestow upon him. His greatness of soul did not desert him, even in his less prosperous days at the close of his life. He left a number of New River shares to the more indigent of the Goldsmiths' Company, of which he had been himself a member; but when a descendant of his, a widow, claimed her share of her ancestor's bequest, she was denied the boon, on the

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\* This circumstance explains the motto, *fontes and fodina*, placed under his arms in some prints of his, published about the time.

quibbling

quibbling pretence, that her husband had neglected the precaution of securing his freedom as a goldsmith. *Tell not this in London, nor publish it in the environs of Islington!*

The engineering genius of Sir Hugh Myddleton could not be idle, even after it had received such a severe shock in the New River enterprise. He afterwards gained 2000 acres from the sea, by an embankment, in the Isle of Wight; and in the mean time prosecuted his mining works in Cardiganshire, so that as late as 1625, he says, in a letter to Sir John Wynn, of Gwydir, that he was then at the weekly expense of 200*l.* in mining, and other undertakings.

In 1631, his useful labours ended with his life.

The next Lessees of these Royal Mines, were Sir Francis Godolphin, of Cornwall, Bart. and Thomas Bushel, Esq. The latter is represented as having once been the faithful servant of Sir Francis Bacon, the father of experimental philosophy. It is no mean compliment to the memory of Mr. Bushel, that he is called a *faithful* servant to that "greatest, brightest, and meanest of mankind,"—as Pope calls him, who owed his own precipitate fall to the premature rise of *faithless* servants and parasites, who crowded about him. On Sir Francis Godolphin's death, the whole management of the mines devolved on Mr. Bushel. Cwm Nymlog being considered as drained of its greatest treasures, he turned his attention to the five mines of Darren Vaur, Tal y bont, Bryn llwyd, Goginan, and Cwm Ervin. Fuller says, in his Worthies of Wales, that the first year yielded him no profit; that in a few more years the weekly produce was estimated at 100*l.* in silver and 50*l.* in lead. The quantities increasing, and Charles I. in 1637; having granted a

license to coin the silver near the mines, at Aberystwyth, instead of conveying it at a great expense and risque to the Tower; Mr. Bushel's profits arose superior to those of any former or subsequent period. The silver coinage at Aberystwyth, was distinguished by having the ostrich feathers, the arms of the Principality, stamped upon it. The coins were of five sorts, pennies, twopences, sixpences, shillings, and half crowns. And, as a still greater mark of favour, Lundy Island was granted him as a depôt for the produce of his mines; though the advantage of such a grant may appear at this time very problematical.

The lead of these mines, about this time, is reported to have yielded 80 ounces of silver per ton. At the breaking out of the great rebellion, Aberystwyth probably not being considered a safe mint, the bullion was conveyed to be minted at Shrewsbury; and Mr. Bushel is said to have supplied the King with 40,000*l.* towards the payment of his troops; with a very slender prospect, if any, of being ever reimbursed. In addition to this, he clothed the King's army; and when the tide of rebellion raged still more furiously, to use the words of Fuller, he converted the mattocks of his miners into spears, and their shovels into shields, formed them into a regiment, and commanded them in person, in defence of a cause grown too desperate for recovery. "All these things did Bushel, as a king, give unto the king\*."

From 1642 to 1649, Mr. Bushel published several small tracts, in which he enumerates the silver and lead mines of Darren Vawr, Bryn llwyd, Tal y bont, Goginan, and Cwm Ervin. In 1650, he petitioned

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\* 2 Samuel, 24, 23.

Parliament for a redress of his sufferings by the civil war; but with what success, may pretty well be conceived. At the return of peace, for reasons better known then than at present, he shifted his scene of mining speculation from the slaty hills of Cardiganshire, to the limestone rocks of Mendip in Somersetshire. It seems probable that he did not survive the restoration of Charles II.\*; for then these Mines Royal became the property of a Company, of which Sir John Pettus, author of *Fodinæ Regales*, was a member. Cwm Symlog, though deserted by Bushel for others more profitable in the neighbourhood, became again considerable as a silver mine; together with those of Darren Vawr, Cwm Ervin, Goginan, Tal y bont, Cwm Ystwyth, Tre'r Ddol, Trawscoed, and Rhos Vawr. "These are the chief mines which produce silver now in working, though not effectually; and by negligence herein, we lose a million of money a year." A great loss indeed, if Sir John by money, meant pounds sterling! In his catalogue of works and workmen, in the year 1667, there were at Cwm Symlog, five hearths for smelting, attended by ten men, who may well employ 500 miners; ten men more in different occupations; apparatus for grinding bone-ashes for the refiners; two men employed in the manufacture of red lead; four washers, &c.

The smelting-houses, and refining mills, were conveniently situated for exportation on the river Dovey, in the township of Sgubor y Coed, in the parish of Llanfihangel Gencu'r Glynn; and from their use, called

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\* Why not? Had Charles the honour of rewarding "these such persons as suffered most in his father's cause?" At the Restoration, Bushel might have been poor, and Sir John Pettus and his partners rich.



silver mills. The peasantry of the country still retain, from father to son, some ideas of the processes of extracting the silver from the lead; and attempt to describe the spot where the "silver cake," as they term it, was deposited in its state of separation from the baser metal.

The prerogative of the Crown, claiming as Mines Royal, all those whose lead yielded silver sufficient to pay the expense of extracting it, and the loss of lead reduced in the process, occasioned several expensive and vexatious law-suits between the proprietors of mines and the patentees, &c. of the Crown. Sir Hugh Myddelton had a law-suit with Sir Richard Pryse, of Gogerddan, about the mines at Tal y bont. In the year 1690, a very rich mine, since called the *Welsh Potosi*, in maps, was discovered, scarcely covered with moss, at Bwlch yr Esgair Hir, the property of Sir Carbery Pryse. The patentees of the Crown claimed it as a mine royal; and it came to be decided at Westminster-hall. The patentees produced proof in court, that the lead of the mine in dispute contained silver to the amount of 60 lb. Troy in every ton; whilst Sir Carbery, on the other hand, produced proof, equally substantiated, of lead in the same mine producing only 48 ounces of silver in a ton. Fortunately for the proprietor, he had engaged the Duke of Leeds and other men of power, as partners in his newly discovered Potosi; by whose interest was procured the celebrated act of the 6th of William and Mary, entitled, An Act to prevent Disputes and Controversies concerning Royal Mines. This act invested mines in the proprietors of the soil, reserving the right of pre-emption in the Crown, at fixed prices, according to the value of the ores. It is said that Sir Carbery was so exhilarated by  
the

the passing of this Act, so favourable to the liberty of the subject, that, by relays of horses, he rode from London to his mines at Esgair Hir, in Cardiganshire, in 48 hours. Considering the state of the roads at that period, this feat of the Welsh Baronet stands superior to any performed by the most celebrated equestrians and pedestrians of the present day.

Waller, agent to the Company of Mine Adventurers of England, about the close of the seventeenth century, published a pamphlet for the information of his employers. Though his golden dreams of the capability or probable resources of the Cardiganshire Mines, were not so extravagant as those of his predecessor, Sir John Pettus, yet they were so highly flattering, that he thought with sufficient means, and 600 men, he would be able, in a few years, to bring in from one vein, a clear profit of 70,500*l.* a year. His estimate ran thus :

10,000 tons of lead may be raised per year, }	£90,000
worth at 9 <i>l.</i> per ton, .....	
Expense of raising, washing, }	£ 18,375
carriage, smelting, &c. .... }	
Incidental expenses, .....	1125
	<hr/> 19,500
Clear profit, .....	<hr/> £70,500

In the year 1700, Waller published a further account of the Cardiganshire Mines, with a map of the mining tract, and plans of nine different works. This was followed, in the same year, by an "Abstract of the present state of the Mines in Bwlch yr Esgair Hir," &c.

After

After the death of Sir Carbery Pryse without issue, his mines became the property of Sir Humphrey Mackworth, of a Shropshire family, but settled in Glamorganshire, by a marriage with an heiress of the Gnoll Castle estate, near Neath. In 1700, Sir Humphrey and Co. took lease of certain places called Bwlch Cwm Ervin, Pwll yr Ynad, and Goginan, for 99 years, in consideration of only 50*l.* in hand. So great were the exertions of this proprietor, that in his abstract, p. 1, he boasts of working and carrying levels into 28 mines. The magnitude of his undertakings at this time excited to action the muse of Yalden the poet; who addressed a poetical epistle to Sir Humphrey Mackworth, on the Mines late of Sir Carbery Pryse.

About the year 1709, dissensions among the partners, produced discord and troubles, and finally the ruin of the mining interest. In 1744, Esgair Hir, Tal y bont, Cwm Symlog, and most other leases in the county were abandoned; Goginan, Cwm Ervin, and Bryn pica, were retained, but not worked;—the four mines of Pencraig ddu, Gröau Gwynion, Cwm Ystwyth, and Eurglawdd only were worked; and ever since, only partial, temporary, and frequently ineffectual trials, have been attempted by different adventurers.

So far, we have given a general sketch of the history of the Cardiganshire Mines, during their most productive and prosperous periods: we intend next to descend to a few particulars respecting the most noted among them.

We have heard it remarked by a Flintshire gentleman—that where veins in a mineral tract run parallel with each other, from *east to west*, for instance;—the richest parts, or at least the richest *accessible* parts, of those veins, would be found nearly opposite each other, in a transverse line *from north to south*. This remark

corre-

corresponds exactly with the line of bearing of the Diemetian mines, from the river Dovey on the north, to the river Towy on the south; as will appear more clearly by referring to the annexed Plan\*, which gives the relative situations of the principal mines, marked with arabic numbers to be named and described in the subsequent account.

3. *Copper*.—The ores of this metal are neither frequent nor plentiful in South Wales. Beginning north, on the Dovey, copper ore is found.

1. At Cefn Maesmor, on the Montgomeryshire side of the brook Llyvnant; discovered by a labourer, about 30 years ago, when some ineffectual trials were made. The proprietor leased it a few years back to a Mr. Dawson, from Derbyshire, for 21 years, at a per tonnage of ore. The vein runs N. and S. The ore is of both kinds, sulphate and carbonate; with varieties of fine dark coloured ochres.

2. Some copper ore is found in both the lead mines of Ynys Cynvelin, and Eurglawdd, near Tal y bont, in Cardiganshire.

3. At Esgair Vraith, somewhat east of the Welsh Potosi silver mine, a copper mine was discovered about the year 1693. So late as 1773, 20 tons of ore was raised, and sold for 15*l.* a ton. In 1791 it sold for 25*l.*

4. On a waste, in the manor of Creuddyn, near Cwm Ystwyth lead mine, a great quantity of copper ore was formerly raised, though very little of late.

5. “ There are caves, hollow pits, and banks of rubbish, at Caio, in Caermarthenshire, which discover there being some mine-works, probably in the Roman

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\* See the Plan, and account of the several Mines, in Appendix, No. I time.

time."—*Eras. Saunders to Lhuyd, Nov. 27th, 1693.*

"Here are both sulphureous and chalybeate springs. Here are traces of an aqueduct, into which was brought, at an immense labour, over the highest hills for many miles, the river Cothi; and thence poured over the excavated mountain, where they dug for ore, in order to clear away the rubbish, as described by Pliny. Considerable quantities of gold are supposed to have been got, of old, in these mines. A beautiful golden *torque*, now in the possession of J. Johnes, Esq. of Dol-Cothi, was ploughed up by his servants in the common field; the extremity of which was adorned with a curious figure of a serpent, of the same pure metal. Another golden torque, adorned with the figure of a dolphin, was lately found near the same spot; and a coarse pebble, in which was inlaid an amethyst, bearing an antique of Diana: all in the possession of the same gentleman\*."

We heard, near the spot, that golden trinkets, of various kinds, in an *unfinished* state, had been found in the neighbourhood. In our opinion, if ever any kind of ore was raised at Caio, it was either of copper or lead; of which the hillocks of rubbish, by being trenched through, ought to afford some fragments for samples. The caves, supposed by some to have been Roman levels, are chiselled out of the solid rock of shaly schist, without any trace of a mineral vein on either side; which seems to argue against their ever having been intended as mining levels; except the miners had been allured to proceed by narrow strings of ore, without any mineral fissure in the rock. As to the

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\* See Cynwyl Ozio, in Cartiale's Topogr. Dict. of Wales.

description given of the river Cothi being brought over high hills and steep precipices, it is to be considered only as a misapplication of terms. If the Roman miners ever used the river Cothi for *hushing*, its highest level must have been at the first point of setting out. As to the labour of bringing it for many miles, that labour was very cheap to the masters of the world; such works being generally performed by their subjugated vassals.

After all, the golden torques, and other trinkets, found on the spot, with roads, such as the Romans made in the neighbourhood; seem strongly to confirm the opinion that those people had some settlement or other at this place: and, especially, if Sir Richard Hoare is right in fixing his new *Loventium* at Llanio, near *Llanddwei-brevi*; for then *Caio* might have been a middle station between *Loventium* and *Maridunum*, (*Caermarthen*.) *Caio*, the ablative of *Caius*, seems a name of foreign origin.

Copper ores, in other places, are so inconsiderable as not to be worth mentioning.

4. *Ores of Zinc*.—The *carbonate* kind, or *calamine*, is found in several places in the white limestone tract, at *Maenllwyd*, three miles east of *Caerphili*.

The *sulphate* kind, *blend*, or *black jack*, in considerable quantities in the slate and shale tract; especially among the *Cardiganshire* lead mines. In some places, in lesser proportion than lead; as at *Llywernog*, *Penbank*, &c.: in others in greater proportion, as at *Gwaith Coch*, *Nant y Meirch*, *Rhiw Regoes*, *Nant y Crair*, *Llwyn Unhweh*. Some mines are worked for it exclusively. Its price of late was 5*l.* 10*s.* per ton; though now it is said to have advanced very nearly to the price of lead ore.

5. *Manga-*

5. *Manganese*,—in several parts of the white limestone tract; at Newton, Gower, Twynau Gwynion, &c. in Glamorganshire, &c.

Of metallic, or semi-metallic ores, we know of none except the foregoing.

6. *Tripoli*, (*lapis curiosus*, or rotten stone,) mixed with a red marly earth, in which are imbedded blocks of gypseous alabaster, under the flag-lias limestone, the sea coast of Glamorganshire, at Penarth, Lavernock Cliffs, &c., and in greater and more pure quantities, on limestone, to the north of Cribarth lime-rock, in Brecknockshire. It is here collected in great quantities, carried down the canal from Hen-Neuadd to Swansea, and thence shipped off for the different English manufactures, where burnishing of metals is carried on. Its situation here is upon the northern verge of the middle limestone tract, where it joins the puddingstone, which separates the limestone from the red sandstone of the Trecastle Beacon. It is generally above or upon the limestone, and occasionally between the strata. It is of various qualities. The masses of the coarser, or more imperfect sort frequently inclose nodules of perfect limestone; and sometimes, what the workmen who collect it, call black flint. The latter, nevertheless, may be a limestone resembling the black limestone of Tauria, &c. mentioned by Mr. Kirwan, Vol. I. 102, 2nd edit. This near Cribarth may effervesce with acids though it give fire with steel\*.

7. *Black Chalk*.—"A soft stone of coal-black colour, found in a rill of water descending from the

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\* See account of strings of flint in limestone in Glamorganshire, p. 39; whether those effervesce with acids is not known to the writer of this article at present, as his specimens were mislaid.



Percelly mountains, in the parish of Melinau, Pembrokeshire. The country people call it *nod glas*, or blue raddle, and mark their sheep with it; which, without any oily mixture, continues its strong azure colour on the wool during the whole winter.”—*G. O. Esq.*

“ It is black chalk, equal for the purposes in drawing to that imported from Switzerland.”—*E. W.*

*A list of Mineral Specimens, collected in the course of the Survey; some curious only from the situation in which they were found.* 1. Micaceous slate, from the Vale of Radnor. 2. Umber, from Radnorshire. 3. Marl, from the same. 4. Marl of excellent quality, from Llwyndyrus; ditto, from Llan-ina, in Cardiganshire. 5. Galcena stratified with its matrix of grey mountain rock, from Cwm Ystwyth mine, Cardiganshire, with crystals of quartz attached. 6. Crystallized sulphate of zinc, from Cwm Castell, Cardiganshire. 7. Ironstone, with the impression of an exotic reed, from the Llangyfelach hills in Glamorganshire. 8. Argillaceous stone, with the impression of a large insect, of the beetle kind, from Lord Dynevor's park, at Newton. 9. Calcareous spar, from Newton Park, and the Bridge Quarry near Llandeilo. 10. *Cleger*-stone, from Marros, near Llaugharne in Caermarthenshire, and from Taaffdingle, near Merthyr Tudful. It generally lies between limestone and coal; and is of various qualities, from a rough burr, used for furnace hearthstones, to a fineness resembling that of chert: the late Mr. Wedgwood called it chert. *Cleger* anciently meant *stone* in general—*Saxon*. 11. Cornish granite, or Hellan stone, from Pembrokeshire, with greenish spots, said by E. W. to be ore of tin. 12. Blueish limestone, for slate pencils, equal to those imported from Nuremberg; from  
Gower

Gower in Glamorganshire. 13. Chert, and greenish whin, from Fiscard, and in general mistaken for serpentine. 14. *Muchudd Irvon*, a ponderous black stone, of fine texture, reckoned better than brass for the center pins of engines to turn upon; in Buallt, Brecknockshire, from Llanwryd Wells to the fall of the Irvon into the Wye.

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SECT. VI.—WATER.

LIKE many other districts, we have sometimes too much, and at other times, in some places, too little of this useful and indispensable element. The sea washes a zig-zag and extremely indented coast of about 230 miles from the mouth of the Romney, on the eastern boundary of Glamorganshire, around Pembrokeshire, to the mouth of the Dovey, on the northern skirt of Cardiganshire, where it separates the southern and northern parts of the Principality. The advantages of this great extent of marine situation will more fully appear in the Sections on Climature, Commerce, and Provisions.

The *Rivers* of the district, that are navigable, are not numerous; and none of them effectually so without the aid of their sovereign, the ocean. Viewing them under this predicament, it may not be improper to give the lead to one of the first of its kind in Britain, if not in Europe, namely, *Milford Haven*. Its Welsh name is *Aber-dau-gleddeu*; i. e. the mouth or æstuary of the two *Cleddeu*; the two principal rivers composing it being so called. The western branch, called by the Welsh *Cleddeu wen*, or the white, fair, &c. riseth  
near

near Fisgard, and floweth southward about 13 miles to Haverfordwest, where it becomes navigable; and continues so for 21 miles to St. Anne's Point, at the mouth of the Haven. The eastern branch, or Cleddeu ddu, the black or swarthy, probably from the turbary waters of the Percelly Mountains, where it rises, serves in some places of its course as the boundary of the counties of Caermarthen and Pembroke; and above Slibeach, becomes navigable for vessels of heavy lading. Proceeding southward about four miles, it meets the western Cleddeu at Picton Point, about five miles below Haverfordwest; and both united join in the formation of this most beautiful and exceedingly useful Haven; being from the junction of the two rivers to the open sea about 16 miles in length; and from Pembroke Ferry downwards, owing to its deeply indented shores, of various breadths, from one to two miles.

2. The second river seems to be the *Towy* (Tywi) in Caermarthenshire. It rises in the wildest part of Cardiganshire, between Strata Florida and the borders of Brecknockshire. After a southern course of about 10 miles, it enters Caermarthenshire, near Ystrad-fân, and continues the same direction for about eight miles to Llandovery (Llanymddyfri), where properly commenceth the celebrated Vale of Towy. The river then takes a more south-western direction, and after a course of about 27 miles, reaches the metropolis of the county, where it becomes navigable. From Caermarthen it winds more southward, and arrives at the grand reservoir of all rivers near Llanstephan, after an highly interesting course of about 53 miles, whereof about eight miles are navigable. Its chief contributory rivers from the north are the Gwili, joining at Aber-Gwili; and Cothi, rising at Cwm-Cothi, near the borders of Car-

diganshire, and joining the Towy, east of the Gwili, after a course of about 24 miles: and from the south it is joined by the Bran near Llandovery, Sawdde near near Llangadoc, and the Cynnen, south of Llandeilo; and several other lesser streams. Owing to the formation of the surface of the county, and the great length of Towy's course, it receives nearly all the streams of the county\*. The exceptions are the Tave, Loughor (Llychwyr), and Gwendraeth, which form three separate harbours, hereafter to be described.

The fish of the Towy, are salmon, sewin, trout, &c.

3. *Loughor* (Llychwyr), hath its source in a very copious spring issuing out of a limestone rock called Llygad Llychwyr, or the Eye of Loughor, not far from the Vale of Towy; but taking a southern course, saved its independence; and after receiving the contributions of the Marlais, Aman and Dulas, after a course of about 14 miles, it enters the Creek of Loughor, near the ancient borough of that name, the *Leucarum* of Richard of Cirencester. Loughor river<sup>d</sup>, however, loses its name here, and unaccountably resigns its honours to a petty rivulet in Gower, called *Burry*; and this extensive creek, in common conversation as well as maps, is called *Burry river*. Owing to the extent and convenience of this fine creek for the exportation of coal, iron, &c. Loughor has been here included among navigable rivers.

4. *Teivy* river has the singularity of giving the Welsh name to the county of which it is a native. It rises out of a small lake, near the source of the Towy, called Llyn Teivy, north of the Abbey of Strata Florida.

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\* "In the county of Caermarthen are 28 rivers and streams, capable of turning mills."—*Original Report*.

After a course of about 11 miles it arrives at Kellan, where it becomes the boundary of Caermarthenshire, and continues in that office for 27 miles, until it receives the brook *Cuch*, which divides Caermarthenshire from Pembrokeshire. From *Cuch*, a little below Kenarth salmon-leap, to its outlet into St. George's Channel, it divides Pembrokeshire from its native county. It is navigable from Cardigan bar to Llechryd bridge, about seven miles, for vessels of small burden. Its whole course is about 53 miles, equal to that of the neighbour of its youth, the Towy. Its contributors are more numerous than copious; which may be accounted for from the narrowness of its passage through mountainous defiles for the greater part of its course.

The fish of the Teivy are salmon, sewin, trout, &c. It is the most northern river in which sewin appears, as the Wye is the most eastern. Sewin frequents most, if not all, the intermediate rivers between the Wye and the Teivy. There is a peculiar marbleness of texture in the Teivy salmon, commended by epicurean taste as highly delicious.

5. *Dorey* brings up the rear of what will be here considered as the navigable rivers of the district. It rises in Meirionyddshire, near Aran Vowddwy; enters Montgomeryshire near Mallwyd, and in a course of 20 miles reaches Machynlleth, where, a second time, it becomes the boundary of the counties of Montgomery and Merioneth. At Llyfnant, the boundary of Montgomeryshire and Cardiganshire, it becomes a semi-South Wales river; and from thence to its outlet, at Aberdovey, it is the boundary between Cardiganshire and Meirionyddshire. Its whole course is about 30 miles, whereof it expends about 23 in North Wales, and the

remaining seven as a boundary of South Wales. It is navigable from Derwen las, in Montgomeryshire, to Aberdovey, where it forms a sea-port.

Its fish are salmon, trout, samlets, &c.

The following rivers, beginning with the Romney, on the eastern limit of Glamorganshire, and pursuing the coast westward to St. David's, and from thence northward to Aberystwyth, are not considered as navigable, because the tides swell them but to an inconsiderable distance above their outlets.

*Glamorganshire.*—1. *Romney* (*vulgo Rhymni*, the old Welsh name *Eleirch*, plural of *alarch*, a swan), rises in the collieries at the northern junction of the counties of Glamorgan and Monmouth; and after being useful in turning the machineries of coal and iron works, denudating the strata of rocks and coal-measures, and serving as a boundary its whole length, of about 27 miles, between the two counties, it enters the Bristol Channel\* somewhat east of the town of Cardiff.

2. *Taaff* (Tav), two of the name, major and minor, have their sources in the most elevated mountains in South Wales, those of Banuwchdeni, or the Beacons of Brecknockshire; and after a tumbling route over millstone and limestone precipices, arrive on the borders of the county, and join just at their entrance into Glamorganshire, at Coed Cymmer, near Merthyr Tudful. Their united stream, in its progress, receives the Bar-

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\* This is incorrect, according to the language of the custom-house, and political maritime arrangements. By them the river Severn is said to extend as far as the Flat Holmes. Consequently the Romney, Taaff, and Elai, though entering into salt water at separate mouths, are said to fall into the *Severn*. Beyond the Flat Holmes, westward, the rivers gain their independence, and are said to fall into the sea.



ged Taf, Cynon, and Rhondda; and after a course of about 33 miles, enters the Bristol Channel at Penarth harbour, near Cardiff. Vessels of 400 tons sail up the mouth of the Taaff to Cardiff.

Its fish salmon, trout, &c.

3. *Elai*, or *Ely*, riseth from the bowels of the mineral basin, and after some miles of poverty, arrives in some of the richest land in the Principality, called *Dyffryn Miscin*, or the Vale of Ely, and after a course of about 21 miles, contributeth with the Taaff to the formation of a most safe and spacious harbour at Penarth.

The smaller brooks are not noticed.

A. *Daw*, or *Dawon*, riseth north of Llansannwr Marsh, and proceeding through Cowbridge, in a short and level course of nine miles, meets the sea at Aber-Dilaw, a small harbour noted for the excellence of the sea-beach pebbles, to be burnt into tarras, or pouzzolana lime, for setting in water. This is a limestone rivulet for the greater part, if not the whole, of its course, and is celebrated for the excellence of its trout.

5. *Ewenny*, riseth in the coal tract north of Llanilid, and after an indolent course of about 10 miles, through the flat Vale of Coychurch, meets the Ogmor just at their joint entrance into the sea, near the ruins of Aber-Ogsor, or Ogmor Castle.

6. *Ogmor* (*Ogwr*), riseth in the mountainous coal tract, in three or four branches, which unite near St. Bride's minor, and after dividing in two the town of Bridge-End, enters the sea with Ewenny, after a course of about 15 miles. The water of this river is much commended by dyers for its remarkable softness. Water from limestone is said to be the best for the manufacture of paper, and from alluvial soils, such as this of Ogmor, for bleaching and dyeing. "*Dwfr pludd yw.*"



7. *Avon* (Avon), another collier, riseth in the same tract of country as the Ogmore, and after being useful in discovering mineral strata for about 15 miles, falleth into the sea at Aber-Avon, near the Margam copper-works.

8. *Neath*, issueth out of the Brecknockshire strata of sand and limestone, and receiving several contributory streams, many of them exhibiting the most picturesque waterfalls, pursues its progress through the coal tract, and falls into Swansea Bay below Britton Ferry, after a course of about 22 miles.

9. *Tawy*, hath its forked source among the stratified sandstone rocks of Brecknockshire,\* near the lofty Tre-castle Beacon; and after crossing the limestone and coal tracts, at the distance of 25 miles pays its tribute to the ocean at Swansea (Aber-Tawy.)

The rivulets of Gower, a dry limestone tract, are few and small. The two following are most worthy of notice:

10. *Penarth Pill*, dividing the parishes of Penarth and Penmaen, and flowing into Oxwich Bay.

11. *Burry*, a small rivulet, famed for its trout, riseth in Cefn Bryn mountain, and running through the parishes of Reynoldston and Cheriton, empties itself into Loughor Creek, which from this simple circumstance is called Burry river, as before observed in the description of Loughor.

*Caermarthenshire*.—12. *Gwendraeth*, the lesser and the greater, rising in the lime and coal tract to the east,

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\* "For almost not a brook of Morgany, nor Gwent,

"But from *her* † fruitful womb doth fetch her high descent."

*Drayton, in Polyolbia.*

† Brecknockshire.

after a course of about 12 miles, unite in imperfectly forming the harbour of Kidwelly (Cydweli), in the Bay of Caermarthen.

13. *Tawe*, has a lofty birth in the Llanvernach mountains, in Pembrokeshire; and crossing Caermarthenshire to Llanvaldeg, becomes for a space the boundary of the two counties: it then crosses again the county of Caermarthen, and falls into Caermarthen Bay, forming a good port at Llaugharne (Llaeharn), after a course of about 24 miles. This river traverses some excellent soil, and might have its navigation extended above St. Clare's. The chief of its contributors are the Morlais, Cowyn, and Cathgenni, exclusive of some inferior streams.

*Pembrokeshire.*—The limestone tract of Pembrokeshire affords only a few pills. Crossing Milford Haven westward, we meet with

14. *Newgall* (Niwgwl), a rivulet separating not only the hundreds of Rowze (Rhos) and Dewi's Land, but also the Englishery and Welshery, and more than that, the coal and slate or rab tract: and

15. *Solva* (Solvach), forming a harbour for coasting vessels of 100 or 150 tons; and both falling into St. Bride's Bay.

16. The next stream of note is the *Gwaun*, or *Gwain*\*, rising in the mountains, and after a course of about 20 miles falling into the Irish Channel at Fisgard, forming the second best harbour in the county. The Welsh name of Fisgard is Aber-Gwaun.

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\* *Gwaun*, a moory plat of ground, producing an inferior kind of peat fuel. *Gwain*, a sheath or scabbard; and as *Gleddu*, a sword, is the name of a neighbouring river, why should not this be *Gwain*, a scabbard?

17. *NeVERN*, after a course of about 15 miles, falls into the Channel at Newport, forming a harbour for vessels of about 100 tons.

*Cardiganshire*.—Passing the Teivy, which we before noticed among the navigable rivers, and proceeding northward across several small streams falling into the sea, near Penbryn, Llandisilio, and New Quay or Llanina, the next river is the

18. *Aeron*, flowing through a beautiful valley bearing its name, and falling into the sea at Aber-Aeron.

19. *Arth*, into the sea at the small harbour of Aber-Arth.

20. *Gwyre*, or *Gwyrar*, into the sea through the celebrated barley tract of Llanrhystyd, a little north of Llansaintfraid.

21. *Ystwyth*, riseth on the hills bordering on Radnorshire and Montgomeryshire, and flowing by Cwm Ystwyth lead-mines, through the demesne and pleasure-grounds of Havod, and the well-cultivated demesne of Col. Vaughan's at Crosswood, after a course of about 22 miles, enters the sea at Aber-Ystwyth.

22. *Rheidiol*, riseth out of a small lake called Llygad Rheidiol, in the Cardiganshire part of Pumlumon, the parent source of the Severn and the Wye; but, as it were, disdaining to take an English tour with those its foster-sisters, it spends its short course within its native county; and having received the agile Monach, the mountebank stream of the Devil's Bridge, and a few other rivulets, it enters the sea very near the Ystwyth. It appears therefore that Aber-Ystwyth should have been called Aber-Rheidiol. The reason in defence of the present name of this fashionable and much-frequented watering-place is—that Ystwyth is the most considerable

able stream of the two—or that Rheidiol formerly gave up its water and its name to its superior, the Ystwyth.

Having thus traced the sources and the outlets of the chief rivers of the four maritime counties, there remains only the rivers of the two inland counties of Brecon and Radnor to be described :

*Radnorshire.*—1. *Wye*, the subject of romance, of painting and of poetry, riseth in Montgomeryshire, between the sources of the Severn and the Rheidiol, in the wilds of Pumlumon. After a course of about 11 miles, it enters Radnorshire, crosses a corner of it about six miles in breadth, and thenceforward becomes the boundary of Radnor and Brecon for 30 miles down to the Hay, where it enters Herefordshire: its Welsh course being about 47 miles.

Contributors to the Wye in Radnorshire are the *Elain* (Roe) *Claerwen* (Limpid) *Cymaron*, *Ithon*, *Edow*, *Bachwy*. From Brecknockshire it receives the *Chwefrwy*, *Anell*, *Cammarch*, *Dulas*, *Irfon*, *Dihonwy*, *Caletwr*, and *Llyfnwy*. Some of these are considerable streams. The *Ithon* and *Irfon* flow a course of about 20 miles each. *Llyfnwy* is the offspring of *Savaddan* lake. *Irfon* receives the *Chwefrwy*, *Dulas*, *Cammarch*, &c. before it falls into the *Wye*.

The independent rivers of Radnorshire.

1. *Tame*, rises in the Kerry-hills in Montgomeryshire—then divides the counties of Radnor and Salop, and enters the latter near Knighton.

2. *Lug* (transparent), hath its spring in the Heyop hills, and passes through the valley of Presteign into England.

3. *Somergild*, riseth in the Forest of Radnor; in its escape thence it forms a cascade called *Water-break-its-neck*,

*neck*, and entering the basin-like Vale of Radnor, it is swallowed in dry summers by the gravelly soil; hence its Saxon name, and probably also the Welsh name of the Vale and the county—*Maes-yfed*. On change of bed from gravel to clay it again appears, and after a course of about 13 miles enters Herefordshire.

4. *Arrow*, a small stream, flowing by New Church into Herefordshire.

*Brecknockshire*.—1. *Usk*, riseth in the redstone tract of the Black Mountain, near the borders of Caermarthenshire, not very distant from the source of the *Tawy*. Like the *Tawy* and the *Nenth*, it may boast its elevated alpine birth. Its bed, whether precipitous or level, preserves its reddish hue from its three springs to its entrance into Monmouthshire at Glangrwyney, below Crickhowell, the space of about 32 miles. Its chief contributories from the recluse valleys of the Eppynt hills on the *north*, are the *Cilieni*, *Bran*, *Esgair*, and *Honddu*. The junction of the latter is at *Aber-Honddu*, the county town, now called *Brecon*. For 16 miles further east than *Brecon*, it receives but few streams from the north: *Rhiangoll*, a rivulet from the beautiful and rich valley of *Cwm-du*; and *Grŵyney*, from the Black Mountains of *Talgarth*, the boundary for some miles between Brecknockshire and part of Herefordshire and Monmouthshire.

From the *south*, the *Usk* receives the *Crai*; *Senny*; *Tarannell*, or *Tarell*, from *Llyn Cwm Llwh*; *Carfanell*, or rather *Annell*, from *Glyn Collwyn*; *Crawnant*; *Onwy*; *Clydach*, and others of smaller note.

It has been noticed in Caermarthenshire, that the river *Towy* is the drainer or receiver-general of nearly all the waters of the county: so in Brecknockshire, though

though fruitful, as Drayton the poet observes, in sources of streams, yet Usk is the only river of consequence rising within it, that maintains its independence until it enters another county. The two rivers, Towy and Usk, are similarly circumstanced; each traversing, as supreme, its own county Vale; and the boundaries of the sovereignties of each, are defined by similar lofty ranges of mountains. In Brecknockshire the elevated and continuous range of the Eppynt on the north of the Usk, turns all the waters of the hundred of Buallt into the Wye; whilst a still loftier but parallel range, on the south of Usk Vale, turns at their sources in this county, the Tawy, Neath, and Taaff into Glamorganshire; the Sirhowy, the Ebwy, &c. into Monmouthshire.

*Beds of Rivers.*—North of the Usk and the Teivy (excepting about 11 miles of the latter course of the Wye, from below the Edow to the Hay, and the northern tributaries of the Usk) the rivers flow over beds of shale, slate, and grey mountain rock. The Teivy is altogether in this grey tract; and the Towy also, until very near its entrance into Caermarthen Bay at Llanstephan. The purveyors of Milford Haven, the two *Cleddeu*, rise and flow in this grey tract—until they attain Haverfordwest and Picton, where they enter the coal tract; they pass it about Lawrenny, and from thence to the ocean are imbedded in limestone, and about Nangle Point in red-sandstone.

The northern rivers of Pembrokeshire are all in the grey tract of shaley slate, indurated grey rock; and occasionally anomalous freestone.

The rivers of Glamorganshire may be termed altogether either colliers or miners. Those of the most extensive

tensive course rise in the red sandstone of the Brecknockshire mountains; the second class in limestone; the third rise in coal and ironstone; and the fourth, or rivers of the shortest course, rise and fall within the second, or southern tract of limestone.

Thus it appears, that the northern and western rivers of South Wales rise in the blueish or grey slaty tract, and continue in it the whole of their course. Usk is the only river of considerable length, that continues in the red soil tract the whole length of its course, from the western to the eastern extremity of the county of Brecon. The *Afan* in Glamorganshire riseth in the coal tract, and falls into the sea within it. This circumstance is owing to the sea having cut through the limestone tract in forming Swansea Bay, and meeting the coal tract at Baglan, &c. The Bay of Caermarthen cuts in, not only through the limestone, but also completely through the coal tract, into the northern tract of limestone; hence the circumstance of anchors finding coal in the bottom of the Bay, north of a line from the mouth of the Burry river to a certain point in Pembrokeshire, between Sander's Foot and Tenby.

Although we have perhaps been tedious in the description of rivers, yet we cannot willingly dismiss this Section on *Water*, without noticing the *Springs* of this district, which are remarkable either as natural curiosities, or useful as sanative mineral waters. These will be comprehended under three heads:—Ebbing and flowing, or recurrent springs;—copious springs;—and springs having powerful medicinal virtues.

*1. Ebbing and Flowing Springs, acting on the Syphon principle.*

1. *Ffynhon Reibio*, or the spring of hydromancy, in the parish of Llandyfeisant, near Llandeilo, in Caermarthenshire,



marthenshire. It ebbs and flows every day, and, according to the vulgar opinion in the neighbourhood, "*with the tide.*" It was noticed by Giraldus Cambrensis, and afterwards by Selden, who, to make a triad, combines it with the Newton syphon spring in Glamorganshire, and the Ffynhon Leinw, at Kilken in Flintshire, which latter has long since ceased its operation.

2. A spring between Newton Nottage and the sea, in Glamorganshire, ebbs when the sea flows, and flows when the sea ebbs. Mr. Fox, in the Original Report of Glamorganshire, p. 13, has given a happy illustration of the cause of this phenomenon, upon philosophical principles.

3. *Golden Well*, near the village of Newcastle Little, eight miles north of Haverfordwest, in Pembrokeshire, is said to ebb and flow regularly with the tide in St. George's Channel, nine miles distant.

4. "A spring at Pant-coed Ifor, near Merthyr Tudful, is said to flow one week, and cease three."—*W. Aubrey.*

## II. Copious Springs.

Rivulets on deep beds of gravel sometimes disappear, and burst out again at a distance, when they meet with beds of clay, or other strong retentive soils. But these swales, or swallows, as they are called in England, are more frequent in limestone tracts than any other, owing to their abounding more in subterraneous chasms and fissures.

1. Near the church of Llanrhidian in Gower, a stream of water rushes with great impetuosity out of the limestone rock, and turns two mills immediately beneath

beneath its spring. Some say it is a brook that is swallowed by the limestone fissures at some miles distance, on Cefn y Bryn mountain.

2. *Llygad Llychwyr*—i. e. the eye or spring of the river Llychwyr (Loughor) is an issue out of a limestone rock near Cerrig Cynnen Castle, south of Llandcilo Vawr, in Caermarthenshire. Its copiousness, some years ago, induced the proprietors of the Ynys Cedwyn iron-works to erect a blast furnace upon it, to smelt ironstone brought from the banks of the Tawy, over several miles of mountainous roads.

3. *Tarren yr Ogof* (the Cliff of the Cave) is a limestone rock near Capel Callwen, on the west of the river Tawy, in Brecknockshire. Out of it issues a constant stream, sufficient for the working of a mill at all times; but a day or two after hard rains the issue is astonishing. We visited the spot in October 1811, on a dry day, after a great fall of rain. The first stream that we saw, satisfied us that it was a copious spring; but on proceeding a few yards farther, we found that the stream we had passed was only the portion allotted for working the mill, and that it was not above one-tenth of the main or parent stream from the rock. The brown or peaty colour of the water at this time, proved that it had connection with the turbary hollows and lakes on the Black Mountains, which lie above, to the west.

The 4th, and most surprizingly and constantly copious of all, is that commonly called by Tourists and others, the *Ogmore Spring*. In the neighbourhood it is known by the name of *Shew-Well*. It is on the western boundary of the parish of St. Bride's major, a little to the south-west of the village of Ewenny, in Glamorganshire. It appears to be the issue of three several springs, uniting just at their emission from the  
limestone

limestone rock. The water at its issue covers a space of about fifteen yards. In its progress it becomes confined to a bed of about 21 feet wide, and maintaining a depth of about one foot, it reaches the river Ewenny, in the short space of about from 30 to 40 yards—the fall in that space being about nine inches. Some say that a part of the river Ewenny finds a subterraneous passage, at some distance above, and re-appears here. But the bed of the Ewenny is too flat to be the cause of such an effect; and the very different properties or qualities of the water of the several springs will not admit such a supposition. The ebullition of each spring is so great, that the waters do not immediately mingle. The two more eastern springs of the three are intolerably cold, and in washing, will curdle soap like an acid. The western spring is of a milder temperature, has been useful in rheumatic complaints, and washes as well as rain water. These are undeniable proofs that the springs, here united, have very different sources in the bowels of the earth.

Several other springs in the limestone tract are so copious, that they turn machineries immediately below their issue, such as appear in the parish of Llangyn-deyrn, in Caermarthenshire, and elsewhere; but they are too numerous to be inserted.

A conflux of springs, called the Nine Wells, at Llandruidion, near St. David's, yields such a copious supply of water, when united, as to work a corn grist mill.

### III. Mineral Springs.

We neither heard of, nor observed, any *thermal* springs in the district; except *Ffyhon Daf*, called by some *Ffynhon dwym*, or the Tepid Well, springing  
on

on the eastern brink of the river Taafl, in the parish of Eglwysilan, about four miles from Llandaff, in Glamorganshire, be considered as such. Its temperature has not been ascertained. Rheumatic invalids are crowded about it in summer, who pay an annual subscription towards keeping the bath in repair. An uncommon flood in the year 1799, is said to have laid bare some Roman masonry adjoining the bath, which have been covered again by the subsequent floods of the Taafl.

Limestone tracts may be observed to be less productive of mineral waters than the slate and coal tracts. The celebrated waters of Buxton, and other places in limestone countries, do not militate against this supposition; as the virtues of those waters are more owing to their thermal and gaseous properties, than to any thing mineral they contain.

In the coal and slate tracts, springs of a chalybeate quality are the most numerous among mineral waters; sulphureous springs hold the second place; and the saline are but few in proportion: of these three kinds, the following are the most noted.

*In Brecknockshire.*—1. *Park Wells*, about a mile west of the town of Buallt (*vulgò Builth*). They consist of four springs within a few feet of each other:

1st, Pure water; 2nd, saline; 3rd, chalybeate; 4th, sulphureous. Three of these springs are roofed over. They are in the slaty tract; and the mason who sunk the foundation is said to have found a stone of calcareous appearance, and effervescing with an acid. This should not be lightly credited. The mason, it is reported, in sinking the foundation, confounded the  
springs

springs, by causing their waters to intermingle. Whether this be an injury, let doctors decide.

2. *Llanwrtyd Wells*, upon the river Irvon, in the parish of Llanwrtyd, about eleven miles west of the park wells just described, in the slaty tract. This spring was discovered by the Rev. Theophilus Evans, vicar of Llanganmarch, an adjoining parish, about the year 1732; who, by the use of it in about two months, cured himself of what he called a “radicated scurvy;” and published a detailed account thereof in the *St. James’s Chronicle* about the year 1739. Some later account of cures performed by this water, was published by Dr. Blinkensop, in the *Gentleman’s Magazine*. He recommends it in scorbutic, nephritic, and hypochondriacal complaints; and among other instances of its virtues, he mentions one on an invalid, who by drinking spirits had so impaired his stomach, that nothing would remain on it. The water was mixed with a little brandy at first, and in a few days drank alone, and the patient perfectly recovered. This spring is strongly impregnated with hepatic gas, a small portion of the sulphat of iron, and still less of the sulphat of soda. Accommodations are much improved, with conveniences for warm and cold bathing; and the place is much resorted to in the summer season.

In *Caermarthenshire*.—1. *Llanarthne* chalybeate wells, within a mile of the church, and within the precincts of Myddleton-hall Park. Sir William Paxton has caused buildings to be erected over them, with accommodations for hot and cold bathing. This liberal Gentleman, as a benefactor-general to invalids, has also caused hot and cold baths, upon a grand scale, to be erected at Tenby in *Pembrokeshire*, for the use of per-



sons who visit that fashionable place of resort. These wells at Llanarthne are in the slaty tract, near its southern boundary upon the red sandstone and limestone. The water has been analyzed by Dr. Saunders.

2. *Ffos Anna*, a chalybeate spring of great repute and efficacy, in the parish of Cynwyl, about seven miles from Caermarthen. This water has been analyzed, but is not much resorted to.

3. Near *Briwnant*, in the parish of Cynwyl Gaio, about seven miles from Llandovery, are two sulphureous springs, reported by Mr. Raspe the mineralogist, to be higher charged with sulphur, than even the wells of Llanwrtyd and Llandrindod; but no use is made of them. Near Pumsaint, in the same parish, is a chalybeate spring much esteemed for the cures it has performed.

In the counties of Cardigan, Glamorgan, and Pembroke, many excellent and powerful chalybeate, and some sulphureous springs, are known, though little noticed. Among others are the following: *Ffynhon y Graig*, near Llyn Teivy; Aberystwyth Spa, in Cardiganshire;—Swansea Spa\*; several springs in the parishes of Llandysfodwg, Llantrisant, &c. in Glamorganshire;—in Pembrokeshire, at St. Dogmaels, Llanllawer, Fishguard, St. Dogvaels, &c. At Tre-Ruffydd, or Griffiston, between the Neve and the Teivy, is a mineral spring, called Alum Well, from which a Dr. Owen had a project of extracting alum. Mr. Fenton, however, calls it a chalybeate, and inferior to none but the Tunbridge water. He never saw such an appearance of *crocus martis*. This spring is enclosed with a stone wall, and about six yards below, it is

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\* A gallon of this water yielded thirty grains of the vitriolate of iron, and eight grains of calcareous earth.—*Monro*, Vol. I.

received into a bath for the use of invalids. In the cliffs not far from Moel-gochi, near Nevern, a spring oozes out, and marks the rock white. This is apparently sulphureous. Near these springs, trials for coal have been made. A blackish earth deluded the adventurers, who too generally consider such substances as belonging to coal; whereas in this instance, as well as many others, the colour is mostly owing to the sulphur and iron pyrites connected with the neighbouring springs.

*Radnorshire* exhibits more mineral springs than the other five counties put together. *Ffynhon Ddewi*, or St. David's Well, in the parish of Llanbadarn Vynydd, sulphureous.—*New-Well*, in the parish of Llan Anno, sulphureous, and “very efficacious in the scurvy and scrophula.”—Two springs in the parish of Llanbister, within ten yards of each other, both sulphureous; one depositing a black, the other a reddish sediment; the latter turning copper white, and silver yellow, in a short space of time. Several springs in the neighbourhood deposit black sediments, and are resorted to in scorbutic complaints. Near Pen y Bont, on the Ithon, are two springs, one sulphureous, and the other chalybeate. Llandegla Well, on the river Cymaron, and Blaen Edow Wells, all sulphureous, and much frequented.

But the virtues of all these Radnorshire springs are totally eclipsed in public estimation, by the long established celebrity of the *Llandrindod* waters. The earliest notice of these springs was about the year 1696. The saline spring only was then known, and used only by the peasantry of the neighbourhood. About 40 years afterwards, Mrs. Jenkins, the tenant's wife who occupied the farm, by repairing the saline spring, and



discovering a sulphureous spring closely adjoining, introduced them to public notice; and from that time to this they are deservedly held in high repute. About a mile to the north-west of these two springs, is a third, a most powerful chalybeate, and dangerously so if not taken with precaution. About the year 1756, an eccentric and almost unintelligible writer, Diederick Wessel Linden, M.D. published an octavo volume, chiefly on the medicinal virtues of these waters. According to this Rosi-crucian chymist, the *sulphureous* spring contains hepatic air and sea-salt. See *Monro*, Vol. I. p. 204. The *saline* water contains Epsom salt, sea-salt, and some earth. *Monro*, p. 49. The *chalybeate* is impregnated with a considerable portion of iron, in a volatile acid, and probably a neutral salt. *Monro*, p. 276. Dr. *Monro*, in treating of another mineral water, p. 466, says, somewhat preevishly, “*examined by Dr. Linden only, from whose report it is impossible to know what it contains:*” perhaps he might have said the same of his analysis of the Llandrindod waters.

Want of accommodations for visitors at these celebrated waters, has long been a cause of general complaint. Such persons as go there purposely for the sake of drinking the mineral waters, certainly have no great convenience of procuring any other beverage. As the enclosure of the extensive adjoining tract of waste land is now on the tapis, it is to be hoped that the Commissioner will fix on some of the most convenient spots for public sale; and that some public-spirited individual, imitating the liberal and benevolent example of Sir William Paxton, will purchase such lots, and erect thereon comfortable accommodations for visitors; and afford to hypochondriacs, and  
other

other invalids, the rational and innocent enjoyments of life.

Strong springs of simple water frequently bear the names of the patron saints of the neighbouring churches. The ecclesiastics of those early ages exercised some prudence, or perhaps priestcraft, in selecting the best springs for the purpose; which in time caused the natural benefits obtained by cold bathing, &c. to be attributed to the miraculous interposition of the saint whose name was perpetuated by that of the well.

Springs on the shore, and overflowed by high tides, when the sea ebbs, flow afresh without tasting in the least saline. One of these is on the sands near Dunraven; another in the Caswell rocks, within four miles of Swansea.

Small lakes are numerous in the mountainous parts, forming the sources of rivers, as Llyn Teivy, &c. The highest summits of ranges of mountains have frequently lakes at their base; as Llyn y Van, the source of the Usk, at the base of the Trecastle Beacon; and, as it were its twin-lake, another Llyn y Van, the source of the Sawdle, under the northern escarpment of the Caermarthenshire Beacon, or *Ban Sir Gaer*; and Llyn Cwm Llwch, the source of the Tarell, under the northern escarpment of the Brecknock Beacons, or *Ban-wach-denni*. Several of these lakes are about a mile in circumference.

The most extensive lake in this district, and the second in Wales, is *Llyn-Savaddan*, in the parish of Llanfihangel, in Brecknockshire. This lake, different from the others, which are situate in dreary elevations, is surrounded with beautiful prospects. It is about two miles long, one broad, and from five to six in circumference. Its general depth is from three to four

yards, and its greatest depth from twelve to fifteen yards. Its fish are pike, some weighing from 30 lbs. to 40 lb. ; perch, from a few ounces to 3 lb. ; and eels of enormous size, which gave rise to the adage, "*Cyhyd a llysywen Savaddan*," as long as a Savaddan eel.

To conclude this Section, it may be observed how amply this district is supplied, by nature and by art, with all the varieties and conveniences of *water*, for all the purposes of social intercourse, and all the exigencies of animal existence: sea, rivers, and canals, for the purposes of home trade, and foreign commerce; sea, rivers, brooks, lakes, and ponds, for the increase and nourishment of the finny tribes, which are able to supply copious means of commerce, and increase of provisions; sea, rivers, brooks, and springs, as convenient and cheap hydraulic powers for the artists and manufacturers; springs impregnated with minerals of medicinal virtues, for the restoration of health to the desponding valetudinarian: and what crowns the whole, as to the indispensable usefulness of water in this district, is its plenty and quality as beverage for man and beast.

In some places, water may be said to be *superabundant* in the soil, such as on the too retentive clays of the coal and slate tract: but the reduction of this superabundance is within the scope of the powers of man, and time and exertion may effect the desirable change. *Deficiency* of water is chiefly complained of in the white limestone tracts of the counties of Glamorgan and Pembroke. The means resorted to in these dry tracts to remedy this deficiency, will be treated in other more appropriate Sections of this Survey—on Puddled Reservoirs, Live Stock, Meadows and Pastures, &c.

## CHAP. II.

## STATE OF PROPERTY.

## SECT. I.—ESTATES, AND THEIR MANAGEMENT.

WHEN the custom of gavelkind obtained over the district, too minute a division of landed property was the obvious and natural consequence: on its abolition, a kind of accumulating attraction, consolidating hundreds of small particles into one globule, pervaded the country; and one central proprietor, possessed of opulence, prudence, or cunning, swallowed into one mass, the surrounding petty freeholds. Many of these amassed properties still continue; and several have a second or third time become split, by sale and purchase, into as many freeholds as the aggregated estate formerly contained of farms or tenements. In a political view, this alternate or rotationary accumulation and subdivision of landed property, may be as salutary for the benefit of society, as the ebbing and flowing of the ocean may be to the salubrity of its waters. If whatever is, is right, it is so: for it is the natural consequence of varieties of human characters, and diversities of pursuits, when operating freely, unshackled by the effects of arbitrary government, that landed property should be always fluctuating.

We dare not even guess at the annual rental of the greater properties from 10,000*l.* upwards. Stackpole

Court, in Pembrokeshire, is said to be situate "in the midst of a contiguous property of 15,000 acres, of the most valuable land, without the intervention of one in capable of improvement." The second class of proprietors, possessing estates between the above sum and 2000*l.* a year, are numerous: and so in an inverse proportion, the estates decreasing in annual value, as they increase in number, down to 2*l.* a year; where ends the character of yeoman invested with the right of elective suffrage. From 200*l.* a year downwards, most of the proprietors occupy their own lands.

The management of the greater estates, and of the properties of non-residents in general, is entrusted to agents of very various qualifications. Some are professed land-stewards, well versed in the several departments of rural economy: others aspire no higher than receiving of rents and fees, and drawing of cumbersome leases and contracts, little calculated to benefit either landlord or tenant.

§1-

## SECT. II.—TENURES.

THERE are but few tenures, perhaps purely allodial; as most freeholders are subject to some acknowledgment of superior or anterior tenure; either in suit and service at Courts, or in paying an annual chief-rent, or both together: the few tenures that are purely allodial, have become so by a previous and forgotten neglect of claim on the part of the lord paramount.

There are a few copyhold manors, retaining their respective tenures; some with fines certain, others at will, according to the custom of the manor. The free tenant  
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of a copyhold of inheritance, with a fine certain, does *fealty only* to the Lord; whilst the tenant of a copyhold at will, is bound to his Lord in both *fealty and homage*.

Most of the copyholds, or customary-holds, as they are called, have, it is said, been long since, by fines, changed into freeholds.

The tenure of occupiers of land, who are neither freeholders nor copyholders, is either *by lease* for years or lives; or *at will*, when the tenant is liable to quit at each year's end.

Lords of mesne manors, receive quit-rents of the freeholders in their respective lordships; and the mesne lords pay an acknowledgment to the lord paramount.

The peasants, or labourers, in some parts of the district, especially among the *Dimetæ* of the three counties of West-Wales, have a peculiarity of tenure similar to that noticed by writers, as obtaining in Norway and Sweden, and even in Cumberland\*. We have selected one instance as a specimen, which we found in the parish of Llanbadara Fawr, in Cardiganshire.

The peasant spent his time all the year round for his employer; in looking after 300 sheep, on the hill in summer, and in the enclosures during winter; ditto 18 horned cattle in summer, and 12 in winter. Ditto making hay on about six acres of meadow land, and about 21 acres more of upland rosey meadow; ditto reaping about nine days ploughing of oats and barley, in about twelve days, letting the same lie in gavels for

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\* This is noticed by Mr. Culley, in the Report of Northumberland. Among the Romans, the stock on the farm belonged to the landlord; and the farmer received a certain proportion of the produce for his labour. Cato notices only these kind of farmers; probably there were no other.—*Dickson on Roman Agriculture.*

about a week, then binding it into sheaves, and had-docking it; ditto carrying home both corn and hay, the employer finding quadrupeds; all for 14d. without victuals; the employer mowing the hay.

The perquisites, in addition to the wages, were, 1st, The house, &c. rent-free; 2nd, the keep of 10 sheep, which by the employer's indulgence had increased to 30, without any surcharge; 3rd, the profit of fourmileh cows for the remainder of the year, after they had given milk towards the rearing of their calves for 15 weeks.

Some peasants have a house and garden, and sometimes the keep of a cow, at a certain rent: the farmer carries a stipulated quantity of fuel to the cottager's door; who, in return, is bound to work so many days in harvest, and his wife also so many, the farmer finding them victuals. Others have their house, garden, keep of a cow, and the rearing of a calf every other year, for three guineas; and in return work for their patron at sixpence a day, from Michaelmas till May, and ninepence from May till harvest, without victuals, saving a portion of bread, cheese, and butter, to be taken home with them each night for their families. In some places, these kind of labourers have one shilling per day, and victuals, during harvest; whilst independent labourers have 18d. or 2s.



### CHAP. III.

### BUILDINGS.

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#### SECT. I.—HOUSES OF PROPRIETORS.

WITHIN a convenient distance of the siliceous and calcareous freestone quarries of the limestone tract, the freestone of the coal tract, the few argillaceous freestone quarries of the shale and slate tract, and near the coast where the Bath and Portland stone can be conveniently procured, the building materials are both durable and elegant; and of course the houses of the opulent are, in magnificence and taste, equal to those of any other country. Many of them still retain their original characteristics of Norman Architecture: some inhabited; some deserted, left to be occupied by the owl and the bat, and their ivy-crowned bastions amuse only the tourist and hunter of mouldering antiquities. Some of the modern buildings copy the old models, and are still called Castles. The situation of several of them, commanding a compound scenery of the grand, the beautiful, and the sublime, stand in need of little, if any, aid from art: to attempt an improvement, in many instances, even by the first-rate professors, would perhaps be murdering nature in her most simple and gay attire.

The greater part of the district, affording few stones excepting perishable schist or shale, the proprietors therein must needs be very badly off for building materials.

rials. Some veins or masses of whin, or trap stones, running through, or deposited in the shale, as has been already described in the Section on Soil and Surface, afford durable building stone, though difficultly dressed. Where none of these veins or masses appear, the builder fixes on a spot where he can procure strata from a considerable depth under the surface, the stones to be immediately laid in mortar, and coated on the outside with a weather-proof cement. Where this semi-indurated schist is not attainable, recourse must be had to burning of bricks. And here, the duty upon that building article, should not be passed over in silence. Very few persons would build with bricks, were other better materials procurable at a moderate expense. To impose a duty of so much per foot or yard upon all kinds of buildings indiscriminately, would be considered as a grievous tax: but it would be by far a more equitable, because a less partial, mode of taxation. Taxing a builder with bricks, because he cannot possibly procure other materials, like the taxing of coal carried coastwise to districts almost devoid of any other fuel, is the same in every respect, as the taxing of cripples because they use crutches, or the half blind because they are necessitated to wear glasses; which neither of them would do, had Nature been more favourable to them.

Spots for building, have of late years been too commonly and too hastily selected, during the summer months, in too bleak exposures; without any reference, by foresight, to the storms and chilling blasts of winter. Shelter and comfort were to be sacrificed to extensive or beautiful prospects from the windows or front area. Our remoter ancestors, though no great connoisseurs in the planning of rooms and conveniences  
of

of domestic economy, were nevertheless our superiors in preferring shelter to prospect. Their dwellings were enveloped in the midst of groves and evergreens. With their successors, about the close of the seventeenth century, denudation became the rage of the day; and the axe was laid to the root of every shrub in the front of their exposed habitations. But some discreet proprietors, at all periods of time, have preferred a situation of mediocrity, contenting themselves with prospects somewhat inferior, for the sake of superior shelter. Of this class was John Lewis, Esq. of Manarnawan, in Pembrokeshire, who wrote about the reign of James the Second: his words on the subject are here quoted from the Cambrian Register, Vol. II. p. 111. "In my memory, most of the great mansion houses have been stripped of their shelter, a principal object with our ancestors, when they made choice of their place of residence, and some few new raised on eminences; whilst in vindication of their rage for destroying their woods, and their neglect for providing a future supply, the possessors of the new-raised bleak dwellings would contend, that thick groves generated dampness, and that an open situation was more favourable to health, whereas the clear contrary is the truth: for as one Clermont, a foreign physician, who resided some time in Pembrokeshire, told me that trees feed on foul air, and are known to thrive best where it is foulest; therefore when we bare our houses too much, we get rid of our best friends. I remember when my neighbour, Sir William Wogan, of Llanstinan, was pondering where he should erect a new mansion, instead of the old, grown ruinous, and was on the point of shifting the old site, which was low, near water, and sheltery, to the summit of a hill that would give him

him a view of the sea; I urged the above philosophical remark, and was the means of prevailing with him to place it where it now stands, a few feet only elevated from the ancient habitation; for which persuasion, the current of fashion rather setting against me, I was much reflected upon."

Of late, the denudating system, and building on eminences for the sake of midsummer prospects, are found to be erroneous; and what was considered as supineness, or want of taste in our predecessors, begins to be valued as a very discreet circumspection, worthy of imitation. Indeed the novel gymnosophistic builders have been driven to several expedients to remedy in part their errors, and to alleviate their winter sufferings from the merciless storms of the Atlantic; by batting the insides of the western and northern walls with upright spars, laths, and plaster; slating the outsides, and planting belts to encounter the most furious winds.

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#### SECT. II.—FARM-HOUSES, OFFICES, REPAIRS, &c.

IN former times, when there was no balance of power, opulence preponderated into one end of the scale. There were few capacious, or even convenient farm-buildings, save as appendages either to a monastery or a baronial mansion. At Castleton farm-house, in the Vale of Glamorgan, we observed a barn, part of which had been built in the Roman style of masonry described by Vitruvius; being layers of large stone binders, placed alternately with layers composed of stones of smaller dimensions. At Monk-Nash, near  
Dunraven

Dunraven Castle, is the skeleton of a barn, of extraordinary dimensions, which formerly belonged to the Abbey of Neath: it is 300 feet long, 40 feet broad, and 30 feet high, accompanied with excellent conveniences for stall-feeding and watering cattle, dovecote, granary, &c. West of the ruins of Coety Castle, near Bridge-End, is a barn of that superior masonry, which bespeaks the age of civil as well as religious chivalry in which it was built. Tradition says that it was originally the Westminster-Hall of the Coety Lordship, as each of the Glamorgan Norman Barons exercised *jure regalia* within their respective baronies. At Lanphey-Park, near Pembroke, formerly a palace of the Bishops of St. David's, is to be seen a remnant of an ancient granary. The northern wall, in full length, is all that remains to shew the magnitude of the scale of the original structure.

At the fall of the military barons and mitred abbots, property, opulence, and a spirit of improvement, had more extensive channels of circulation. The residences of great proprietors, in general, had conveniences of barns, buildings, and yards, attached, upon improved constructions; but it is of late years that the yeomanry and tenantry were invited or permitted to partake of this rustic luxury. For the good of the nation, the Genius of Agriculture is permitted to reside, and become a welcome guest in the mansions of our greatest proprietors. Like the virtuous Romans of old, they now think it no disparagement to their births, or their fortunes, to be taken from the plough to the senate, or the consulship.

The degrees of improvement in constructing farm-buildings, have nevertheless been various in different parts of the district. Some parts are far more favourably

ably situated as to materials, than others; but nevertheless, even in the *shale* tract, some proprietors are doing all they can to render their tenants more comfortable in this respect. It must, however, be confessed, that Brecknockshire, upon the whole, has taken the lead in providing more suitable and convenient buildings than any other county. The effect is obvious; and for the cause we must refer, probably, to an early institution of an Agricultural Society therein; and the concentration of opulence and intellect, in the sociable fraternity of landed proprietors, who have always resided in the town of Brecon.

A Welsh tourist, about the year 1720, says of Brecon, calling it Aberhonddu, "*Dyn'r dref gyfoethocca yn Nghymru*;" i. e. That is the richest town in Wales. If we calculate upon opulence derived from landed property, the remark is still true. A spirit of rivalry in improvement once excited, daily intercourse and conversation made it more general and permanent. One gentleman probably set the example, by taking one of his worst conditioned farms into his own hands, until he had reclaimed it so as to be fit for a proper course of tillage, and had erected thereon suitable buildings. He then let it to a responsible tenant, and took another of his farms under his own management, for a similar term, and for similar purposes: and so on in regular succession. The example took, where precept most probably would have failed. For many years back, there was not a gentleman resident in Brecon, but either had been, or then was, a practical farmer. Their improvements gradually extended to the remotest corners of the county; even in the hundreds of Dyfynog and Bualt, we recognise the superior buildings and farm-yards of the Brecon Society.

There

There is a peculiarity in their barns, which we have not noticed to be so general in any other county; though it begins to be copied in the adjoining ones of Caermarthen and Radnor. It is their having double folding-doors on each side the barn floor, for the convenience, especially during precarious harvests, of driving in a load of grain under cover, in the dusk of the evening, to be unloaded early next morning, whilst another is loaded in the field, &c. These driving floors occur occasionally in other counties, but here they are more general, even upon the smaller farms. They are also uniform in having ledges or cornices of boards fixed over the pitching holes and doors of their barns, to prevent damage either to grain or timber frames.

Farm-houses and offices, *of recent erection*, are well planned and built, in every part of the district. The number of such new buildings are yearly on a progressive increase: more perhaps have been erected within the last twelve years than within the forty preceding years. To give a description of them would be useless; as they are on plans and principles known and adopted in every part of the kingdom, where improvements have taken place; that is, a main body or corn barn, having a tangent wing at each end, for stables, cow-ties, open sheds, &c. &c. the yard opening to the milder points, the south, or south-east.

The writers of the several quarto Reports of the counties of South Wales, printed between the years 1794 and 1796, made just complaints of the state of the farm-buildings in general at that period. The intelligent Surveyor of the counties of Caermarthen and Pembroke, says—"The situation of farm-houses in these counties is frequently very bad. They are in many instances built in low bottoms; and, in others,



at the extremity of the farm. Each of these inconveniences should be studiously avoided in all future erections of this sort; and also another inconvenience, which has of late years crept into this country; namely, that of erecting farm-houses upon situations *too* elevated and exposed. Three things should direct the choice of a situation for a farm-yard; water, shelter, and centrality. Wherever this combination of conveniences can be found, is the proper situation to build upon. Avoid if possible, a western exposure, which in this district is the most distressing wind we have to guard against. In a farm-yard lying to the south-east, and sheltered by the buildings from the west and north, the cattle always thrive best. It frequently happens, that water may be brought to the situation on which you wish to erect your farm-yard; a good pond should always be made at the lower side of the yard, to reserve a stock of water for irrigating the meadows below. The profits resulting from such a convenience, are too obvious to need further remarks\*."

Again—"The state of farm-houses and offices in this district, is, for the most part, very defective. Many of the farms that have been taken into the landlord's hands, for the purpose of improvement, are well established with buildings, and other conveniences; but by far the greater number are, in this respect, in a very sad condition; and it would be difficult for an English farmer to conceive the shifts and contrivances made use of, as substitutes for proper accommodations.

"The present method of binding tenants by their leases to keep the buildings in repair at their own cost, and to find all materials for the purpose, does not ap-

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\* Caermarthen Rep. p. 33.    Pembroke Ditto, p. 39.

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under value, in consequence of the new tenant taking the repairs upon himself."

"Some landlords are of opinion, that if the leases were so framed as to engage the tenant to do all workmanship and carriage for repairs, and new erections; and the landlord to provide all unwrought materials, the husbandry of the district would be greatly improved, and the landlord's interest not impaired thereby."

"If where old leases exist, the tenants were to allow the landlord five per cent. for the monies expended in providing materials for new buildings, I believe much good would result to both, by such measures: the face of the country would soon wear a better countenance; the possession of convenient, comfortable structures, would bring the tenantry to a neatness in the management of their farms; and raise their minds above the make-shift beggarly habits, which too many of them now practise. It is meant that the landlord should always be consulted, as to the extent, situation, and structure of the buildings\*."

Similar complaints, of the wrong situations and bad state of farm buildings, were made about the same time, from Cardiganshire, and the other counties. The terms—incommodious—comfortless—wretched—were applied, in order to give a description of them. As we have before observed, many instances of the causes of complaint which *then* existed, are *now* removed; and wherever they are not *yet* removed, if they occur on the estates of the nobility and gentry who have imbibed the laudable turn for general improvement, which has within these dozen or score of years manifested itself in the country,—there is every reasonable hope to ex-

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\* Caermarthen Rep. p. 47.      Pembroke Ditto, p. 31.



pect, that they will in their turn be metamorphosed, from their present disgraceful state, to every thing that is commodious, comfortable, and convenient. As "Rome was not built in a day," so a whole age may be too short to improve the whole of an extensive estate.

"Want of granaries, or store-rooms for the thrashed grain, is a more general complaint than any other where buildings are in the worst state. Farmers are necessitated to thrash their corn, to have straw to feed their cattle; and then, for want of granaries, they must sell the grain in winter, when it is cheapest; and many of them, in the spring, or at farthest in summer, must buy their own food, at an advanced price. And as they get their labourers to work on low wages, upon condition of finding them bread corn at a low settled price; when their own store is out, the poor labourers must buy in market at an advanced price, in general, but without advance of wages. And even if the corn be not prematurely carried into market, as it must be kept in the house, in sacks, subject to the depredations of vermin, and injury of damps\*."

"In *ancient* improvements in buildings, &c. Glamorganshire may vie at least with any other county; and will be found superior to most. This has superinduced an inattention to modern improvements; as the want of them has not been so severely felt as in some other parts of the kingdom: hence their unfrequent appearance in this county. A number of very large old barns† are amongst the most remarkable antiquities of the county, and indicate a very early attention to tillage. Some ancient farm houses and yards are much on the

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\* Cardigan Orig. Report, p. 16.

† See the dimensions of the old barn at Monk Nash, p. 100.

plan of the Roman villas, such as those at Bewper, near Cowbridge, and other places."

*Note on Mr. Fox's original Report, by Mr. Edward Williams.*—"The state of the farm-houses, in the Vale of Glamorgan, is not very good, and not well situated, owing probably to want of civilization when men herded in villages for mutual protection."—*John Franklen, Esq.*

### SECT. III.—COTTAGES.

WHAT has been said of farm-houses and offices, will also apply to cottages. Proprietors of an improving turn, will have an eye to the comforts of one class of their dependants as well as the other. There are situations and circumstances which render the building of farm-houses and cottages, as well as other edifices, more easily feasible in some parts of the district than in others. This will better appear in the next Section, when treating of *Building Materials*. In the limestone, and sandstone tracts, near coal works and manufactories, cottages might be expected to be of the comfortable class: and so they are in several instances.

Sir John Morris, Bart. of Clasemont, near Swansea, seems to have been the most extensive individual builder of comfortable habitations for the labouring class. He first erected a kind of castellated lofty mansion, of a collegiate appearance, with an interior quadrangle, containing dwellings for forty families, all colliers, excepting one tailor, and one shoemaker, who are considered as useful appendages to the fraternity. More dwellings being still wanted in the vicinity, about the year 1768, he laid the foundation of Morriston, so called from the founder'

founder's surname; where dwellings have been erected for colliers and manufacturers, in well formed and spacious streets: with a church, containing an organ, for such of his workmen as prefer the established religion. This chapel of ease to the church of St. John's in Swansea, he endowed. Being somewhat of a latitudinarian, he erected also a chapel for nonconformists. His architect, William Edwards, the celebrated bridge-builder, being himself a preacher, to distinguish between heterodoxy and orthodoxy, placed the protuberance of a tower at the west-end of the church, and at the east-end of the chapel, which is elsewhere scrupulously considered as a badge of distinction.

The founder of Morriston's plan, was to grant ground leases on plots of land, about a square rood each, for three lives, or 50 years, at 7*s.* 6*d.* a year each plot. The lessees were to build according to prescribed plans. He moreover encouraged some of the most steady labourers, and others, with a quantity of land each, sufficient to keep a cow. Only two or three thatched hovels once occupied where this neat little town, containing a population of about 1100, now stands, a prominent feature of increasing wealth and comfort. Mr. Fox, in the year 1796, says, that in the year 1780, there was not a single house where Morriston now stands: that in 1796, there were 141 houses inhabited by 619 persons; so that in the 16 last years, the population has nearly doubled.

When the demesne of Llangennech Park, near Llanelli, in Caermarthenshire, was, a few years ago, under the management of Mr. Vancouver, brother of the circumnavigator of that name, he constructed a cluster of new and well-built cottages in a situation somewhat singular; namely, on a section of an artificial tumulus, near the church of Llangennech, called *Pen Clawdd y*

*Dommen.*



*Dommen.* There are three cottages, with dwellings for two families in each on the ground floor, and for two more on the upper story of each; and the whole forming a white-washed crescent along the base of the tumulus. The entrances into the ground floor apartments, are from the road, on the south side; whilst those into the upper apartments, are from the summit of the truncated tumulus, on the north side, to which there is an ascent by a flight of stone steps along the inclined plane of the tumulus. At their entrances, the upper stories, of course, have all the appearance of ground floors. About a quarter of a rood of land was to be attached to each dwelling for a garden, at the yearly rent of three guineas. The length of each cottage was 40 feet from out to out. The floor was divided into four rooms; a kitchen of 12 feet square at each end; and the middle division of nine feet in length, was divided into two bed-chambers of six feet width each; and each communicating by a door with its respective kitchen. The same plan and dimensions served the upper stories, only the doors, for reasons before specified, were on the reverse side.

“ My great ambition has been to make my labourers comfortable; for which purpose I build *cottages* of 80*l.* and 100*l.* cost; which I sometimes add land to; and sell every article from my farm at less than market price to them. Their wages about 15*s.* per week all the year. My cottages let from 2*l.* 10*s.* to 4*l.* 10*s.*”—*Sir Edward Hamilton.*

Near the mansions of great proprietors, adjoining iron works, at some few small creeks, on the coast, as towns and sea ports are out of the question; handsome modern built cottages are here and there met with: but huts, of the most humble plans and materials, still form the great majority, as will hereafter appear.

Amongst



Amongst the more ancient cottages and small farm-houses, *three* sorts attract our notice: 1. The cottages, &c. of the Vale of Glamorgan; 2. Those of the Fleming race in Pembrokeshire; 3. Those of the Welsh Dimæ in the three counties of West-Wales.

1. *Glamorgan*.—Every tourist, from Mr. Penruddock Wyndham in 1781, to Mrs. Morgan of a later date, notices the universal custom of white-washing, not only the inside and outside of houses, but barns and stables also, walls of yards and gardens, the stone banks of quickset fences, and even solitary stones of large dimensions, horse-blocks, &c. near the houses. This practice, said to have been repeated monthly, or at least several times in the year, is traced to a very remote antiquity. Diodorus Siculus, is quoted as mentioning the British custom of white-washing houses. The Welsh bards, from Aneurin, in the sixth, to David Thomas in the eighteenth century, notice and commend the practice of white-washing in Glamorgan\*.

It is not improbable that this liming of dwellings,

☛ Gwawd ym Morganwg ..... *muriau gwynion*.

One of the peculiarities of Glamorgan, are ..... and *white walls*.—

*Aneurin, about the year 550.*

The bard invoking the Sun, says,  
Teg fore, gwna', lle yn llon; ag annerch y tai gwynion.  
Thou orb of the bright morn, beam joyfulness around,  
And salute the *white houses* of Glamorgan.

*Dai Gwilym, about the year 1360.*

Morganwg *muriau gwynion*.  
Glamorgan of the *white walls*.

*Deio ab Ieuan Du, about 1450.*

..... Sir Forganwg, y tai gan galch yn wynion amlwg.  
Glamorgan, its *houses*, by liming, *white* and conspicuous.

*David Thomas, about 1720.*

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concurring with other causes, preventing infectious diseases, &c. may occasion that extreme longevity which has been so frequently noticed in this highly favoured Vale. Mr. Malkin, in his Tour of South Wales, has detailed several instances of great prolongation of life in this tract, from 100 to 180 years. He enters the last item with some diffidence; saying, "I believe the account to have been extracted faithfully from the register of Llanmaes, but am not at all answerable for the veracity of this parochial document\*."

*Extract from the Register of Llanmaes.*—"Ivan Yorath buried a Saterdaye the xvii daye of July, Anno Doni 1621, et anno regni vicessimo primo annoq. etatis circa 180. He was a soldier in the fighte of Boswoorthe, and he lived at Lantwit Major, and he lived much by fishing."

There is some difference between the above extract, and another copied *verbatim* from the register by the Rev. Robert Nicholl, and inserted in Carlisle's Topographical Dictionary of Wales, under the article Llanmaes. Mr. Nicholl reads, "xii day of July in lieu of xvii; *regis* between *regni* and *vicessimo*; Sowdiar pro soldier; fighte pro fighte," &c.

As instances of longevity, bordering on the marvellous, have occurred in other countries, especially those of Thomas Parr and Henry Jenkins, why should not this entry in the register of Llanmaes be entitled to credit; for what motive could there have been for the pious fraud? It is more than probable, that the person who registered the age, believed the account himself; and he was possessed of means of enquiry at that

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\* Vol. II. p. 545, octavo edition.

time, so as not to be grossly imposed upon. Persons might be living in the neighbourhood, at the time of Ivan Yorath's death, who remembered him an old man about 100 years old, when they were young.

But to return to *Cottages*, the white-washing of which in the Vale of Glamorgan, caused this digression upon longevity.

"The antiquity of the cottages is a strongly marked feature in the appearance of this county (Glamorgan). There is little doubt that many of them are as ancient as the castles to which they were attached. Their architecture is as deserving of observation, as that of more ostentatious buildings. The pointed door-ways, and pointed windows, sufficiently evince their date; and though Welsh towns are universally censured by strangers, for the inelegance and inconvenience of their houses, the direct reverse is the fact with respect to the habitations of the peasantry here. There is no part of England, where the general appearance of the cottages is more neat and respectable than in Glamorganshire; and those of them which are ancient Gothic, and they abound in every direction, carry with them the recommendation of a venerable exterior, and a portion of internal room, comfort, and security from the elements, rarely enjoyed by their fellows in any part of the world. In many cases it may be truly said, that the labourer is better lodged than his employer\*.

It need not be added, that these comfortable cottages are constructed of stone, well laid in mortar; with both which materials the county abounds. Another peculiarity of the rural buildings of this county is, that they

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\* Malkin's Tour, Vol. I. p. 100, octavo edition.

are universally thatched with wheat straw ; though the sea coast might be supplied with argillaceous slate from Pembrokeshire, Cardiganshire, or North Wales ; and the interior with siliceous or micaceous tiles, called Pennant slate, from the adjoining hills of the coal tract to the north of the Vale. The only known apology that can be made for this indiscriminate waste of straw is, that the thatching work is done with uncommon neatness ; not surpassed, perhaps not equalled in any part. The origin of this neat thatching, is in the prevailing practice of the county in hand-reaping their wheat crops, without any confusion of ears and straw. A similar care is taken in thrashing on the floor. The stalks are crushed as little as possible. When taken up to be bound into whisps, called bellies, an iron hand-rake is sometimes used to comb out the loose or straggling straw. Sometimes the straw is drawn through an instrument, such as flax-dressers use, called a heckle. The butt-ends of the whisps are struck against the floor, to make them even ; which are then neatly bound with a twisted bandage of straw, and laid aside for the thatcher's use. The thatcher trims the ears of each whisp with a reaping hook, that they may lie closer ; or perhaps that they may not entice vermin. Small whisps or pilions of straw, neatly bound, are laid across and bound to the spars of the roof, as a foundation for the upper covering, which is laid at right angle to the former layer. The thatcher divides the prepared whisp into two or three handfuls, which he lays on in succession, holding them firmly at the top with his left hand, whilst he is smacking the butt-ends with his right hand, to force the straw into a bevel line parallel with



with the spars or roof; fastening each handful in succession with a bent and twisted stick, called a scolp; and so proceeds until the roof be covered.

It may be understood by the foregoing account, that the straw is very little crushed by the flail in thrashing; and even where thrashing-machines are used, they are so constructed, that the straw does not pass through them, so as to be rendered thereby, in their opinion, of less value for thatch-work. The straw thus uncrushed, and laid on thick, the points only make their honeycomb-like appearance on a new roof. Lines of rod-binders are neatly laid in various fanciful figures, under the bases of the chimneys, and on each side of the summit of the roof. If the windows stand higher than the front wall, they occasion elliptical curves in the thatch, without scarcely any projecting dormers, as usual in common buildings. The best straw, in the opinion of the thatchers, is that growing on the strong soil of the blue and grey lias limestone from St. Donat's to Penarth cliffs; being superior to the straw of the lighter soils of the white limestone, &c. which are more inland.

In most parts of Wales, straw of every kind is called *swellt*. In Glamorgan, loose straw only for fodder or litter goes by that name; whereas the uncrushed and bound straw for thatching is called *cawn*: hence *dyrnu yn wellt* is to thrash loose straw; and *dyrnu yn sawn*, is to thrash bound straw for thatching; which is sold by the farmers to cottagers and others, at about 8s. per hundred of five score; a price nearly equivalent to 3s. a thrave of 24 corn sheaves, bound into 12 pilions or bellies of straw, in other parts of the district. The thatcher uses two trimming-knives; one made out of a piece of an old scythe, bent to a right angle with the haft, edge inward, to cut level the eaves,

caves, instead of a reaping-hook; the other a bent shaving tool to smooth the surface as the thatcher proceeds; which is done with a steady back stroke downwards.

Formerly thatchers worked more by day-work, requiring about 2s. per day: of late they work more frequently by the piece; either by the quantity of straw, number of pilions, &c. or by the square of 100 feet. The charge on simple thatch, is 3s. 6d. per square; and 1s. 9d. more, in all 5s. 3d. for rowling, or laying a transverse course of neatly bound whips, called *gorachod*, across the spars of the roof, as a foundation for the surface layer.

Notwithstanding the neatness and thickness of the Glamorgan thatch-work, it is said it will not last, without repairing, more than from 15 to 18 years; whereas in the more slovenly manner in which thatching is done in other inland counties, it frequently lasts from 20 to 25 years. There the straw is considerably crushed in thrashing, and is thrown promiscuously to the side of a pond or river to be well watered. It is then drawn from the wet couch, and bound into sizeable bundles, and these again laid in regular sided heaps of several feet or yards, and every layer wetted in succession. When fermentation commences, which is known by the heating of the heap, then is the time to lay it on the building; the straw yielding a vegetable gluten, which is supposed to render the thatch more firm and durable.

In some places, where fern in great quantities lie convenient, they are reaped, and laid on ordinary buildings, in the same manner as straw: but the most durable of all vegetable thatches, is that made of green fern, full grown, and placed promiscuously under the  
foot

foot of the thatcher, who is incessantly treading, beating, and dressing; the materials being handed to him by a waiter. A partial fermentation ensues, which is supposed to conduce to its duration of 30 years, or even the age of man.

Rushes, sea-reeds, and broom, are also used for thatching, where they lie convenient. Broom mixed with fermented straw, makes a durable thatch.

Some of the Glamorgan cottages are single dwellings; some double, with a chimney at each end; others treble, with three chimneys, one in the centre. Some of the more ancient of three dwellings, have only one outside door, leading to apartments A; an inside door from A to B, and another from B to C. (*Plate II.*) These refer us to times of rapine and plunder, when one door was easier defended against the besiegers, than two or three. These cottages have generally the necessary appendages of kitchen-gardens, and the ornaments of flower-gardens; and the walls are frequently shaded with fruit-trees, sweet briar, privet and jessamine.

2. *Flemish Cottages in Pembrokeshire.*—That the Flemings, before their emigration from the stoneless fens of the Netherlands, should dwell in mud-walled buildings, is easily accountable; that they knew not how to construct any other buildings when they first came into this country, is not strange; but that they should now, after a lapse of 600 years, continue to build their cottages, and even their farm-houses, of mud, over extensive parts of this county, where stones and lime abound, is so singular, that we cannot account for it, without referring to the difficulty of eradicating national as well as individual habits. Beside their predilection for mud-walls, and round wattle-and-



and-daub chimneys, there is frequently a peculiarity in their plan of building. The chimney generally starts up from the front wall, close to the door. A farm-house has frequently a cross-aisle jutting out at right angles, from the centre of the main building; and the chimney rises out of the junction of the eaves of both, close to the door.

“The inhabitants of Gower, near Swansea, are considered as of the same Netherland race as the Flemings of Pembrokeshire; but they now differ from them in several characteristics. The Gowerians have well-built houses of stone, which are regularly white-washed, and perhaps more frequent than in any other part of Glamorganshire. They are moreover cleanly and neat in their persons, and lively and cheerful in their demeanour, which cannot well be said of their kindred tribe to the west of Caermarthen Bay.”

*3. Dimetian Cottages in the Three Counties of West Wales.*—Mud-walled buildings are more excusable in the shale tract of these counties, where the rocks consist of very perishable materials; and lime is far-fetched and dear; but near the anomalous whin-veins, which here and there traverse the tract;—near the mine works of Cardiganshire, where the rocks are more slaty and indurated; in the siliceous uplands of Pembrokeshire; in the maritime coasts of both counties; and near the limestone and red sandstone of Caermarthenshire; they are inexcusable, and contribute much to the disgrace of the country. A mud-wall, ing about five feet high, a hipped end, low roofing of straw, with a wattle-and-daub chimney, kept together with hay-rope bandages, and frequently from its inclined posture, making every obtuse angle with the gable

gable end, over which it hangs; all together, present to the idea of the observer, a guinea-hen brooding over her chickens. May this brief description be the only existing memorial of such dwellings in less than half a century to come!

The uplands of the three eastern counties, Glamorgan, Brecon, and Radnor, exhibit too many samples of very inferior cottages, as well as other buildings; but they are not so general.

Gentlemen's seats are distinguishable from cottages, not only by their sizes or plans, but also by their colours. In Glamorganshire, where cottagers generally white-wash their dwellings frequently; gentlemen mix ochre with lime, to make their seats of Isabella yellow. In the north of Pembrokeshire, &c. the taste is reversed: the cottages are of a very dingy colour, and gentlemen's houses are white-washed. On enquiry, the observation of a cynic was, "the maxim is—not to be what the lower classes are, not to coincide with the vulgar in their practices. Taste or not taste, is never the consideration; but vulgar or not vulgar."—*Diogenes alter.*

#### SECT. IV.—BUILDING MATERIALS.

##### *Fossile Substances.*

1. *CALCAREOUS Freestone*—in the white limestone tract of Glamorganshire; in the parish of St. Fagan's, the Taff river, resembling the Portland stone; at Llantryddyd; Welst St. Donats; Penlline; Newton juxta Cowbridge; Golden Mile; Seaton; Tythegston; Pen y Lan; Pwll y darren; Heol y March; Pentre baan; Tewgoed; Caer Twymlynn, &c.

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2. *Siliceous freestone*, in the grey lias tract of Glamorganshire, &c. The nearer the boundary of the coal tract, the more extensive the quarries; as at Llanharan; Pencoed; Tre Brynn; Llangewydd; Bridge-Engl, on the Ogmore, at Coety; Pyle; Llanrhidian, in Gower, &c.

Of the foregoing freestones, consist the chief architectural ornaments of the county, in its ancient castles, abbeys, cathedral, churches, towers, &c. as well as in its more modern buildings.

3. *Freestone of the Coal Tract*—more argillaceous than the two former species, in regular beds several feet thick, undulating, dipping, and bassetting, with its concomitant coal-measures.

4. *Siliceous Stones of the Red Sandstone Tract*—from the Brianog Mountain, near Crickhowell, in Brecknockshire, in a line nearly west, to Nolton, and Caer Vai, near St. David's, on St. Bride's Bay, in Pembroke-shire. The Nolton stone, of a dark grey colour, has been represented as possessing the quality of resisting the action of fire and maritime exposure in a very superior degree. Some houses in the new town of Milford, and the new buttresses at St. David's, have, however, brought this stone into a temporary disrepute, by showing symptoms of too early decay. The Rev. Moses Grant, removes the blame from the stone, and lays it upon the Contractor, who took his materials from the most accessible strata, instead of that which contained the proper Nolton stone, which he says is equal to the Portland stone in all respects.

5. *Anomalous Freestone*—in the shale and slate tract, in detached quarries, and in a parallel line of bearing  
with

with the Northern detached limestone rocks already described, from north-east to south-west. The freestone quarries lie north of those of limestone, and are found in the following places. 1. On the Forest of Radnor. The quarries appear to have been worked at some remote period; but for what buildings, excepting, Old Radnor Church, and the tower of New Radnor, is not known. In 1805, T. Frankland Lewis, Esq. re-opened the quarries, in order to build new offices at Harpton Court. All his materials were Radnorshire productions; freestone from the Forest, lime from Old Radnor, and micaceous tiles for roofing from Clayrow Hill, in the red sandstone tract; 2. On Llanwenog Hill, west of Llanbedr (*vulgo* Lampeter); 3. Near Llechryd; 4. Near Penbryn, in Cardiganshire; at the quarries of Bwlch y Crwys, Quintan, and Pen y Gaer; forming good ashlar, tomb-stones, troughs, rollers, &c. 5. At *Cwm Cerrig Nadd*, near Ystyffilan Carn, in Caermarthenshire; 6. At Newport, and other places, on the sea coast of Pembrokeshire; and of a burry kind at Coed-cadw in the parish of Nevern.

6. *White Limestones*, or rather stones of any colour yielding *white* lime: of the primitive or mountain species, in the middle range, from the Bloreng in Monmouthshire to St. Bride's Bay in Pembrokeshire: of the secondary or *strotz* kind, in the southern range, Vale of Glamorgan, Gower, and Castle Martin in Pembrokeshire.

The fracture of these white-limestones is irregular, splintery, and occasionally somewhat conchoidal, so that uniform courses of masonry can hardly be worked with them. They are nevertheless excellent materials for building. The modern method of work-

ing them, is to cause the mortar to project out *between* the stones about half an inch; then to strike an angular joint with the trowel, by which the mortar is glazed; and when hardened, around stones of all shapes and sizes, the whole appears a kind of grotesque bas-relief.

7. *Lias Limestone*—bluish or grey, burning into a buff coloured lime strongly cementing in water. Along the sea coast of the Plain of Glamorgan, from Pennarth Cliffs to Dunraven; and in isolated patches from the Vale of Miskin or Ely, to Bridge-End and Llallaston, as already described in the Section on Soil and Surface.

The strata of this stone are very regular, continuing the same thickness throughout, whether it be a few inches or a few feet; with their surfaces as smooth as those of slate, cross fracture, earthy and uniform; so as to be easily broke or dressed into square joints. The six, eight, and ten inches, &c. strata are kept separate by the mason, in order to make uniform courses; and are accordingly worked in what is called Flemish bond by bricklayers; that is, with headers and stretchers alternately, and the courses so disposed, that the middle of the stones of one course stand opposite to the joints of the next. A specimen of a building of this kind is observable in the Town Hall, at Bridge-End, built at the expense of T. Wyndham, Esq. of Dunraven Castle, the worthy Representative of the County in Parliament. The main part of Dunraven Castle itself is of the same materials. The whole of the *lias* tract abounds with such buildings; and when we consider the superior qualities of both stone and lime, they must be pronounced durable, and in a great degree elegant; though the masons, in general, do not take the trouble of

of keeping separate strata of the same thickness, when they are raised out of the quarries, in order to form regular courses. It seems to be suggested by taste, that the thicker courses should never lie upon such as are thinner. For instance, the base of the wall should be constructed of 10 or 12 inches courses, to be gradually diminished into nine, eight, seven, or six inches, as the work proceeds upwards. This would contribute to the reduction of labour, as well as the elegance of symmetry. Difference in the thickness of courses made of this stone is unavoidable, without a great unnecessary expense; as the cliffs and quarries exhibit strata of all varieties of thickness, which cannot be reduced to any one standard or dimension.

8. *Firestones for Ovens, &c.*—These are worth enquiring after, in a limestone tract of several miles square; and are found at Sully, Cadoxton, Barry, Maes y Vellan, Pencarreg, Giganan-Bridge, Abernant, St. Hilary, Coety, Llangewydd, Margam, Llanrhidian, &c. in Glamorganshire: and on the boundary between the limestone and red rab, in Castle Martin, in Pembrokeshire, &c. in most parts of the red sandstone tract, and in the whin and trap veins of the shale tract.

9. *Beds of indurated Schist, Whinstone, Trap, Porphyroids, &c.*—traversing the shale and slate tract, in the direction described in Section 4, afford, where they occur, good and substantial materials. A range of hills, running transversely from the Dovey, west of Machynlleth, through the mining tract of Cardiganshire, to Plumstone Mountain in Pembrokeshire, in many places exhibit regular and accessible strata of building stones of large and well squared dimensions.

Bridges, houses, &c. are built of them; but, nevertheless, mud, sticks, and straw, are too frequently resorted to, for ordinary dwellings, &c. even where these stones encumber the adjoining grounds. Blue schist also affords excellent building stones, in a line across the whole Principality, from Conway to Fishguard. The new jail and church-tower at Cardigan, afford good samples of masonry executed with this stone: and not far off, at Peny Llan, cornices and other mouldings have been worked of it. The blueish colour of this stone, when well worked, gives it a pleasing if not elegant appearance.

10. *Semi-indurated Shale*,—where no better materials can be had, is frequently used in the shale tract. To be rendered durable, it requires to be nearly buried in mortar; and that, unfortunately in a tract where lime is very distant, and consequently dear. Hence the necessity, in several instances, of resorting to the next article—

#### *Artificial Materials.*

11. *Bricks*.—Either honesty has followed justice, in quitting the abodes of mortals, for the more pure celestial regions; or our ancestors had the penalties of the Acts of Parliament, prescribing the method and time of making and burning bricks, more fresh in their memory than their descendants; for formerly they made bricks much better than at present. Now, a brick-burner and a rogue are terms very nearly synonymous. It is but seldom that the clay is sufficiently tempered, so as to be rendered plastic and dense. It is too frequently thrown, almost immediately, from the pit into the mould; and that at unreasonable times of the year.

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The builder or employer is the loser. The maker receives his pay, and government its duty, for so many thousands of moulded bricks; but when the kiln is opened, it too frequently happens, that a great part will soon become useless rubbish.

*Fire-bricks* of excellent quality, are made in great quantities, in the manufacturing parts of the coal tract. The materials are clunch, or alluminous shale, with quartz, and other stones, pieces of old bricks, &c. ground between iron cylinders, worked by the agency of water or steam. They are used for furnaces, ovens, lime kilns, &c. and sell cheaper, in proportion to their quality, than the common bricks.

12. *Metallic scoriæ, copper slag, &c.*—are drawn from the smelting hearths, into moulds of any shape that may be required. Close to the works (for their weight prohibits their being carried to a considerable distance), they are used as a coping for walls, small out-buildings, battlements of bridges, &c. They are the perquisites of the smelters, who will dispose of several tons, for a few shillings to quench their thirst.

#### *Fossile Roofing Materials.*

1. *Argillaceous Slates.*—Colour, blueish grey, &c.

1<sup>o</sup> Caermarthenshire, at Coed Gwili, two miles from Caermarthen, great quantity raised; quality good.

In Pembrokeshire, in the Glog quarries between the Presselly range and Caermarthenshire; near Llanstinan, four miles from Fishguard; in several places on the coast, of great extent, and excellent quality, from thence to Newport, where slates are quarried out of the overhanging cliffs, by men working from suspended stages, until they get a footing in the rocks. The slate quarries continue their progress northward

to the Teivy; and through Cardiganshire to Ynys Iŷr, near the Dovey, where they enter Meirionyddshire. The Ynys Iŷr slates are of excellent quality, and are shipped off for London, &c. There are slates in several of the inland mountains, but only a few worked. A new taste in rural buildings only, will cause them to be opened to any extent.

South Wales slate are generally of small dimensions; and sell accordingly from 7s. to 9s. per thousand.

2. *Micaceous schist*,—provincially called Pennant tiles, in the middle strata of mountains running north-east and north-west through the red sandstone tract. This schist lies generally upon strong building stones of a greyish colour, and under red sandstone of the ashler kind, whereof the highest mountains in South Wales, from the Sugar Loaf, in Monmouthshire, to the Van in Caermarthenshire, consist; as is more fully described in the Section on Soil and Surface. This micaceous schist differs very little from that of the sandstone quarries of the coal tract. Both are used for similar purposes; for roofing-slate, flooring-flags, some nine feet square, tomb-stones, mile-stones. For roofing they are generally heavy. The lightest we noticed was on one of the rear wings of Penlline Castle, in Glamorganshire, now the property of Lord Clarendon, though they were said to be nearly half an inch thick. Their colour is generally a purplish grey, bespangled with minute particles of mica.

#### *Artificial Roofing Materials.*

*Iron-rolled Plates*—about the blast furnaces of the coal tract, some plane, others curved (C), similar

lar to burnt tiles. The whole roofs, spars, side-rasers, and all, are frequently of iron.

*Fossile Ornamental Materials.*

1. *Marble.*—The southern, or secondary limestone tract, exclusive of calcareous and siliceous freestone, affords excellent samples of marble. Some beautifully variegated with yellow and light liver colours; some with four colours, resembling the brocatello of the lapidaries, at or near Llandaff bridge, Castell Coch, &c.: some of liver colour, slightly variegated, at Newton Nottage.

At the Mumbles, in Gower, limestone is raised by the ton, to be shipped off to the coast of Devon, &c. When the quarrymen meet with approved marble slabs, they preserve them for Messrs. Wallace and Gubbins, who have erected machinery on the Sketty brook, north of Oystermouth Castle, for the sawing and finishing of the marble. The quarrymen are induced to be careful, by having for the marble slabs about six times their value as limestone for the kilns. Poor is the bargain where gain attaches to no side; but here the benefit is mutual. This marble is variegated of white, yellow, and liver colours, and some dark beautifully streaked with white. An elegant specimen of this marble is to be seen at Newfont, at Margam Church, made from an antique model in Lysons' collections.

The middle, or primitive range of limestone, also affords marble; varying, as well as its parent rock, from the former, being darker in colour, and less gaudy; and found near Merthyr Tudful, at Bwa Maen, near Pont Nedd Vaughan, in Glamorganshire; at *Craig y Nos*, near the head of the Swansea Canal, in Brecknockshire. The Welsh name of the rock bespeaks

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bespeaks the sable colour of the marble it contains. It has not yet been worked; though the convenience of water-carriage, by the canal, may soon turn it to a profitable speculation.

2. On the same range, westward, at Llangyndeyrn, a few miles south of Caermarthen, black, studded with white, manufactured on the spot for chimney pieces, &c. and exported to Bristol, &c. This black marble, burning into white lime, proves its being coloured by bitumen rather than iron, the bitumen being sublimed by calcination.

3. Black marble, variegated with white, near Tenby, in Pembrokeshire.

2. *Gypseous Alabaster*, of the best quality, and in large quantities, under the blue or flag lias limestone, at Pennarth, Leckwith, Lavernock, &c. in Glamorganshire: apparently the same as the alabastrites of Pliny, and the compact gypsum of Kirwan. It is exported to Bristol, to the inland counties up the Severn, and to the West of England; used for vases and ornamental articles; and, when burnt to Paris plaster, for cornice mouldings, and varieties of bas-relief figures.

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**SECT. V.—FARM, AND FARM-YARD CONVENIENCES, PECULIARITIES, &c.**

GLAMORGANSHIRE may very aptly be styled the land of building-stones and mortar; which are applied to various purposes, uncommon in tracts where they are less abundant.

**1. Pig-**



1. *Pig-styes*, of entire masonry, without an inch of wood or iron, excepting for a door. The outline of the plan, is a short cone resting on a cylinder. The micaceous schist, and thin lias strata, are very convenient for erecting these conical edifices, which is done by gradually diminishing the diameter of each course or layer, until the cone terminates in a single locking-stone on the summit. These, surrounded with a court of stone walling, all white-washed, not excepting the victualling trough, to use the words of Mr. Malkin, "give the whole an air of architectural dignity, not granted to the habitations of so slovenly a race in England." He might have added, that the proprietors of the slovenly race are not so comfortably lodged in many places.

"Arched, or *cave-work* roofs (as masons term them), should be adopted for rural buildings, in every country where timber is scarce, and consequently dear; and where good stone and lime are in the greatest profusion. Such roofs would endure for ever; and would be, even in the first instance, far less expensive than roofs of timber, &c. A hint, however, is all that can be given here, and not a regular architectural dissertation.—*E. W.*

This kind of cave-work roofing may be seen in some church-towers; the bellfry of St. Bride's, or Llan Saint Fred, in the Vale of Usk, below Brecon, has a curious appearance; and the tower of the new church at Bala, in North Wales, is of the same construction, save its being a pyramid instead of a cone.

It is singular that cave-work, or arched stone-roofing was more common formerly, when timber was in greater plenty, than at present. Mr. George Owen, in his *History of Pembrokeshire*, says, "The masons  
were

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were so skilful in old tyme in these countreys, that most castells and houses were builded with vaults, very strongly and substantially, without loftes; whereas now, in all new buildings, these vaults are altogether neglected\*."

Farm-buildings in Glamorganshire, are, in general, less in size and fewer in number than in most other countries, in proportion to the quantity of grain raised, and the number of live stock reared. Staddles for grain in the stack-yard, and a great proportion of the horned stock being out-liers in winter, obviate what would otherwise be deemed a deficiency.

2. *Corn-staddles* are made of solid frames of stone, coated over with good mortar plaistering; and a course of flat stones laid, to project seven or eight inches over the frame, to prevent the admission of rats, &c. They are oblong squares, of all dimensions, according to the size of the farm, for barley, &c. and generally round for wheat. In precarious harvests, especially that of hay, perpendicular vent-holes are made from the base to the top. In Pembrokeshire, similar stone and mortar staddles have horizontal flues worked by the mason, meeting in the centre, and these connecting with the upright vent. Both these kinds will be further described in the Section on *Harvest*.

3. *Stone cribs*, or racks, for foddering out-lying cattle in winter, in yards, and occasionally under sheds, facing the south. Some are in a straight line, some with a right angle at each end, and others semi-

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\* Cambrian Register, Vol. II. p. 96.

circular. The back, where open without a shed, is a wall of stone and mortar, with sometimes a quick-hedge to its rear. The front, plaistered, is about two feet and a half high, with a coping of rounded stones. The space for the fodder between the sides, is sufficiently higher than the ground, so as not to admit water from underneath. Apertures at every six or seven feet let out rain-water; or if the crib be an inclined plane, one aperture at the lower end may suffice. Hay-seeds may be saved in them. The yard has commonly a pond of water at one end, and a gate at the other, opening into an adjoining field.

It is to be regretted that such foddering-yards for the augmentation of manure, are not more numerous; instead of the very common practice of dealing out the hay for out-liers, in loose litter, all over the field where it grew, and where it was stacked in harvest. The latter practice, as long as it is persisted in, must be the very bane of the turnip system, the best and most rational foundation of improved culture. An apology for this practice is inserted in the Chapter on *Live Stock*.

4. *Water-ponds of Lime and Stone*, are very frequent, and not less necessary in the dry limestone tract of the counties of Glamorgan and Pembroke. In many places, no other water but such as is preserved in cemented excavations, is easily procurable for cattle and other species of stock. The brooks are few, and frequently disappear in swallows; and the fissures in the limestone subsoils absorb all the rain-water in a short time. Hence necessity, always the mother of invention, first suggested the plan of a water-pond. They are made of stone and mortar, on a basis of puddled soil,



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soil, gravel, and sand ; with a gradual descent, on as many sides as requisite, to a central bason ; and so contrived as to have inlets and outlets into two, three, or four fields, where so many meet in a point. In the pavement, small stones are preferable to large ones, to prevent the slipping of heavy and clumsy cattle. Formerly, they had parallel rows of catch-stones, jutting above the pavement, about two feet and a half or three feet asunder, which are of late unadvisedly neglected.

John Mirehouse, Esq. of Brownslade, in Pembroke-shire, whose extensive farm lies upon a thirsty limestone, has contrived a large reservoir on a clayey spot, to supply smaller stone-and-mortar ponds, by means of covered pipes ; so as to command water occasionally for about 150 acres of pasture land. In his opinion, the lesser the pond the better ; as the water, by frequent repletion, is fresher and cleaner for the stock. He reprobates the idea of large ponds, and planting willow and poplar about them ; for though the trees, when grown, would shade the cattle, and partially prevent the evaporation of water ;—yet, the size of the pond, and the shelter afforded by the trees, would induce cattle, in hot weather, to make other uses of it than drinking, which would render it unfit for the main purpose it was intended. Shade might be better contrived in other parts of the fields.

5. *Portable, or removeable thrashing floors*, are used in several of the counties of South-Wales, but more generally in those of Cardigan and Pembroke. They are constructed of deal boards or plank ; of various sizes, from nine to fourteen feet in length, and from six to eight feet in breadth. The surface is braced together underneath by strong ledges of oak. Two men  
generally

generally thrash, one on each side of the floor; sometimes both, or more, on the same side; the floor inclining from them; so that the grain, when separated from the straw, falls off freely upon the lower floor; from whence it is occasionally collected into receptacles called bins, constructed for the purpose in the corners of the buildings; there to be preserved until winnowed from its chaff.

These kind of floors are used most commonly under cover; though they are frequently taken out, on dry weather, into the stack-yards, or even into fields; and there used, whilst others are employed in the barns. In cases of emergency,—seed-time—exportation of a cargo—precarious weather, &c. when it may be expedient to thrash a great quantity of grain in a short time, an embargo is laid on all the portable floors of the neighbourhood, which are brought together, and the busy scene commences.

This practice extends from the counties of Cardigan and Pembroke into the adjoining parts of Caermarthenshire; and has been formerly more in use than at present in Glamorganshire; where it was termed, “*dyrnu llorfaes*”, q-d. *llawr-faes*; in English—field-floor thrashing.

“This moveable floor thrashing is in some respects useful; but work cannot be performed, with any expedition by it: one floor on a farm, however, would not be amiss.”—*E. W.*

6. *Stiles of stone and mortar*, on footpaths, in the limestone tract, &c. have their two ends constructed of common masonry; with a *lias* flag, or any other flat stone, three or four inches thick, and from two to three feet wide, laid edgewise, and pannelled into the walling  
at

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at each end; with steps on both sides where requisite. A great quantity of materials is wasted in some of them; so much, that were materials and labour valued so high as they are in many places, the estimate of some of them would not be under 30s. or 40s. We saw a slab of lias limestone forming a stile, near Bridge-End, which was studded with marine exuvizæ.

Several other articles of masonry are extravagantly massy in Glamorganshire. On Rhuthyn common, near St. Mary Hill, we observed a township *pound*, well made of stone and mortar, 31 feet long, 21 feet broad, and seven feet high. Allowing a foot for the foundation, the whole walling measured upwards of 92 yards; and inclosed an area of about 72 square yards, of excellent soil; but apparently of little use as a pound, for the hay therein was exuberant.

7. *Pigeon-houses, or dove-cotes*, “in many places are really ornamental: their height, size, and circular construction, give them at a distance the effect of castellate towers, and some of them are actually of very considerable antiquity.”—*Malkin*.

These pigeon-houses are of the same construction as the pig-styes already described; with arched, or cave-work roofs. A longitudinal section of a very ancient one of that kind is to be seen among the ruins of Blaenllyfnwy Castle, near Savaddan lake, in Brecknockshire. In Glamorganshire they are numerous, at St. Donat's, Monk Nash, Lantwit Major, &c.

## CHAP. IV.

## MODE OF OCCUPATION.

A DISTRICT of such extent and varieties of soil and climature, must necessarily impose various modes of occupation on the managers. In the uplands, rearing of stock is the main object, without neglecting the produce of the dairy; whilst they find convenience, though without profit, in a scanty and precarious tillage. In the lowlands, on moist loams, especially in the more humid climature of the western counties, grazing is considered, and generally recommended, as most profitable. But the steady increase of population, as steadily increasing consumption of food, and that in Wales consisting chiefly of bread, decides the controversy between speculative theorists, turns the balance of profit, by an advance in the price of grain, to the scale of tillage, and causes the majority of votes to cry—" *Success to the Plough.*"

Upon an average of the whole, the district may be said to be occupied in that kind of system called mixed husbandry—breeding, dairying, and tillage; varying in the proportion of each, in different places, according to the imperiousness of existing circumstances, which will be hereafter more fully explained.

# SECT. I.—SIZE OF FARMS.

By referring to notes taken on the spot, and to the form r separate County Reports by different persons ; in the respect of the size of farms, one county seems to be only a counterpart of the other.

We heard but of two gentlemen who occupied upwards of 1400 acres each ; one in Cardiganshire, and the other in Pembrokeshire. Notwithstanding the prevailing outcry against consolidating farms into one holding, instances occur of the practice becoming retrograde. Boverton, a farm of 800 acres, of excellent level land, upon the grey lias limestone, in the Vale of Glamorgan ; and Bewpyr (Beau-prè) about 600 acres, nearly adjoining, have lately been subdivided into several holdings.

Next to farms of the above extraordinary size, there are a few from 800 to 600 acres. From 500 to 300 they become numerous ; and from 200 to 100 acres still more so. The general run of the smaller farms is from 30 to 100 acres ; and the average of the whole district may be between 50 and 60 acres.

“ The most beneficial size of farms is about 100l. a year, not much more nor less. A farm of 50l. a year is too small for any regular system. The 100l. farm to be divided into four parts ; one in hay ; one in pasture ; one in tillage ; and one for extra uses ; such as seasons, and other circumstances of the times, as plenty or scarcity, or other accidents might suggest. On this also experiments to be tried on a prudent scale. Or one-third in tillage, one-third in pasture, and one-third in hay. On rich and sound loams, as much as circum-  
stances

stances would permit should be preserved of old pastures; but on wet strong soils, old pasture is not so valuable; or if at all, it is chiefly for the dairy.”—

*H. Knight, Esq.*

The rents of the larger farms are not so high in proportion as those which are smaller: the latter having always the greater number of bidders.

## SECT. II.—RENT, OR ANNUAL PRICE OF LAND.

IN the neighbourhood of towns and manufacturing places, the price is above the real value; and includes a considerable premium for convenience. In such situations, pasture or hay ground lets from 3*l.* to 5*l.* per acre, and occasionally more. Farms on the best soils let from 1*l.* to 35*s.* per acre, and so on retrogradely, lowering as the soil and situation decrease in value,—down to 14*s.* to 10*s.* 7*s.* and 3*s.* per acre.

Land in Cardiganshire, upon an average, lets full as low as in any of the other counties; yet, the celebrated barley tract, between Llan Rhystyd and Llan Non, on the western shore of the county, on which barley has been grown every year beyond the reach of memory or record, being a light sandy loam, full of rounded pebbles, lets for from 20*s.* to 25*s.* per customary measure, which is equal to about 33*s.* per statute acre; though in the vicinity thereof, near New Quay, we saw excellent pasture land valued by its own proprietor at only half a guinea an acre.

Mr. Clark, in his quarto Report of Brecknockshire, p. 11, in the year 1794, stated the rent of 128,000 acres of good land in the county, at from 12*s.* to 16*s.* an acre; and 96,000 acres of middling land, at from 4*s.* to 7*s.* and 102,400 acres of poor and mountainous land, at

from 4s. to 7s. This was certainly bringing very good land, and very poor land, to too near an equality; especially when all circumstances are considered, exclusive of the quality of the soil, such as climature, and convenience of procuring manure. Unfortunately the poorer soils are the farthest from lime and every other species of manure, excepting peat in a few places. It is difficult to value such land too low. Frequently a sheep-walk upon the mountains, attached to a farm, is of more value to the farmer than the farm itself. To load such a poor farmer with opprobrious epithets, for not manuring and improving his almost Siberian desert, is the next thing to madness. Men of some opulence have occasionally done wonders in temporarily improving such alpine tracts, according to plans prescribed by these builders of castles in the air. They improved the face of a wild country; they benefited labourers and society by circulating money in these new channels; but the worst part of the tale is behind—they ruined themselves and beggared their families; and their farms, too hastily reported to be permanently improved, have reverted to the state of nature. Mr. Clark is now no more!—Peace to his shade!—Had he been still alive, the writer of this article would not have retrenched a syllable from these observations.

The rental of Brecknockshire would perhaps be nearer the mark were it thus estimated:—

128,000 acres at	from 18s. to 24s.—average 21s.	£134,400
96,000	10s.—18s. — 14s.	67,200
102,400	8s.—7s. — 5s.	25,600
185,600 wastes		

512,000 average of the county. Total £227,200

The foregoing animadversions on Mr. Clark's



high valuation, refers only to poor elevated land, *unimprovable* by a tenant, for several reasons, exclusive of a dispiriting distance from lime. His valuation of the good land is as much too low, as that of the poor land is too high. We agree with him, however, in the conclusions he draws from farms (he must mean *improvable* farms) being let at too low rents. His words are—"Were all the occupiers of land in the nation, exempted from the payment of rent, the ruin of themselves and families, as well as a general famine, would, in less than half a century, probably be the consequence. And it somehow unaccountably happens, that an advance in the rent, in the place of depressing, generally invigorates the spirit of agriculture, by calling forth into action those powers, that had before been permitted to lie dormant\*."

A striking illustration of the truth of the foregoing remark, has fallen under our own observation. A gentleman, noted for his liberality to his tenants, during the last seventeen years of his life, laid out upwards of 20,000*l.* in improving the farms of his tenants at will, without charging them a penny in advance of rent. He died: and his successor, of a different cast, leaving off improvements, tried what doubling of rents would do. And it is painful to relate, for it borders on a libel on human nature, that this advance of rent, considered exceedingly grievous at the time it was imposed, had a greater effect in improving the agriculture of the estate, than all the benevolence and forbearance of his predecessor. The tenants were now compelled to do themselves, what another did for them before.

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\* Original Report of Radnorshire, p. 25.

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\* Original Report of Radnorshire, p. 25.

Retailed land frequently lets very high. We met with an instance near a small market town, where land was grazed by sheep till the latter end of May. The hay crop was then let at three guineas an acre ; and the aftermath until Christmas at 35*s.* an acre ; and the land to be grazed by the latter until the end of the following May ; and so on, &c. &c.

The selling price of landed property has been much enhanced within these few years. About ten or twelve years back, old enclosed farms might have been bought, and not in the worst part of the district, at from 17*l.* to 20*l.* an acre ; and even under that, at seventeen years purchase. Now, very ordinary waste land, sold under the authority of acts of enclosure, has advanced to various prices, from 30 to 100 guineas per acre.

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SECT. III.—LEASES.

Nor to grant leases to good tenants, of an industrious, improving turn, betrays a tyrannical disposition ; while at the same time, by granting leases to tenants of a contrary character, the landlord must have the mortification of seeing his estate diminishing in value ; and that he has so far alienated his own property as not to have it in his power to improve it. Both these are evils ; and both are among some of the most effectual obstacles to improvement. Many tenants have the means, inclination, and ability of improving their respective farms ; but if a farmer improves while his holding is only from year to year, he is apprehensive of an advance of rent upon that very account ; consequently he continues firmly in the old system of letting things remain in the state he received them from his  
prede-

predecessor; not altogether because he suspects the honour and integrity of his landlord, or the just dealing of his agent, though sometimes there may be reasons for both; but it would be a case of extreme uncertainty, which few men of reflection, having a family to provide for, will risk. The man of honour may die as well as the unprincipled; and his heir may not think himself bound to observe his predecessor's verbal engagements: or the farm may be sold, or otherwise alienated; and the new landlord will naturally stretch every point to make his new purchase pay good interest. There are instances of tenants at will being nearly ruined, by having expensively improved their respective farms; which, as soon as the improvements had begun to repay them, became the property of others, such as would not be incommoded by any nice qualms of conscience which might plead the tenant's case.

Then it seems that the general granting of leases would be an evil; but granting none at all, would be a greater one. Of two evils the least should be risked. A happy medium should be pointed out, whereby the landlord may be secured from not having his property injured by his lessee; and the improving tenant also rewarded by a return of his expenditures, with interest. This medium must be obtainable by *lease*.

“Nothing promotes the cause of agriculture more than giving proper encouragement to improving tenants, who keep their farms in neat order, and their soil in good condition. Wherever a landlord perceives such a progress upon any of his farms, it is humbly presumed he cannot promote his own interest better than by holding out all reasonable assistance to the industry of the farmer. When his *lease* expires, it is an

act of equal justice and policy to give such a tenant a substantial proof of the preference he holds in his landlord's esteem. If larger offers are made for the farm, than it may fairly be deemed worth, they ought not to be listened to. It is dangerous to let a tenant, whose good management you are not confident of, come upon a farm that has been put into good condition by another. The man who has improved it, is more likely to set a proper value upon his former labours, and to keep the lands up to what he has brought them to." Indeed it is notorious, that those estates, whose proprietors have the good sense to treat their tenantry with candour and moderation, are much more productive than those of other proprietors, whose conduct is harsh and sometimes severe."—*Charles Hassall, Esq.*

"*Leases* are too seldom granted on arable farms, to the injury of the community, the landlord, and the tenant; for no *prudent* man will grub, moot, drain, fallow, lime, and sow land, at an expense of eight or ten pounds an acre, without a *certainty* of enjoying his farm long enough to be repaid his expenses, and some profit for his risque and trouble. All experienced land-stewards know how to insert covenants to prevent the tenant from injuring the farm, and to secure a gradual improvement of it: twenty-one, or at least fourteen years, are necessary, as much out-set expense may be expedient."—*John Franklen, Esq.*

"It cannot be expected a tenant will go to much expense in marling, or any lasting improvement, with a short or uncertain possession. If the tenure is for years, the three or four last may be employed to the great injury of the land. Security for life gives energy to action; and as few men live so long as they wish or expect,

expect, improvements are carried on to the last. Hope comforts the tenant, uncertainty the landlord."—*Thomas Lloyd, Esq.*\*

"The best lease (and leases are absolutely necessary, in my humble opinion, for an improved system of agriculture) is that for *one life only*—the life of the tenant. The termination of the lease being uncertain, and the nature of man to flatter himself, and hope the best, by putting the evil day of dying afar off;—the tenant will be disposed to manage his farm well to the last. In opposition to this, it may be argued, that the lessee may become an invalid; his heir, &c. of course will have the management, and seeing the precariousness of the lessee's life, will he not be tempted to beggar the soil, by extracting from it all the crops he possibly can? And how can he, in such a case, be best prevented from so doing? The answer is, granting the case possible, though not probable by restrictive clauses in the lease; and by holding out to the manager, if heir to the lessee, a prospect of having a renewal of the lease at its expiration."—*John Mirehouse, Esq.*

The two last gentlemen coincide in opinion, that the *life of the tenant* is the most approveable term of a lease; and the more it is considered, the stronger it appears. It is generally more satisfactory to the tenant than any reasonably definite term of years; whilst at the same time there is a very probable risk that it will be more advantageous to the landlord. A

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\* This gentleman was the author of the Report of Cardigan Lower, printed in the year 1794. He had at one time about three thousand acres of his own property under his own immediate management, for the patriotic purpose of improving it. But alas! Death is no respecter of persons, or of the public good; his shaft is levelled at the industrious as well as the indolent.



tenant, whose life, by the most exact calculations, would not be worth above five years purchase, would nevertheless prefer it, in general, to a term of fourteen, or even twenty-one years. There is a current anecdote of a tenant, in his 70th year, taking a lease of his farm for twenty-one years, and afterwards regretting that he had not applied to his landlord for a lease *for his life*. Whether this be an absolute fact, or not, it is, however, a fac-simile of human nature.

Leases are much more numerous, and much more in credit, in this district, than in that of North Wales.

In addition to the foregoing opinions on the necessity and utility of granting leases, the following observations on the several kinds of leases, and instances of extraordinary terms, are here inserted, as not foreign to the subject.

1. *Leases for ever*, or nearly so. “The Marquis of Bute has some leases on his Glamorganshire estate, renewable for ever, on paying certain fines.”

“The parish of Crughadon, in Breconshire, is mostly, if not all, under leases for 999 years.”—*The Rev. Mr. Hughes*.

The historian of Brecknockshire, vol. ii. p. 297, transfers the seat of these extraordinary leases from the parish of Crughadon to the adjoining one of Gwenddwr; and says, that the leases are held, at a nominal rent, for *one thousand* years; commencing generally the 4th and 5th of Philip and Mary; and granted by James Gunter, Esq. William Gunter, Esq. and Rhydderch ab David ab Rhydderch.

“In this neighbourhood (Llangynydr, south of Usk river) many leases depend upon the flow of an impetuous mountain current, called *Crawnnon*: the lessee to—  
have

have and to hold, &c. "as long as the river Crawnnon continueth to run *downwards*." Vol. ii. p. 518. The term of a lease, &c. of this kind, or for ever, is expressed in Welsh by—"tra bo dwfr yn rhedeg, a haul yn codi;" *i. e.* as long as water flows, and the sun rises.

The close containing the site of Cowbridge Castle, has been leased by the Corporation for 999 years.

2. *Leases upon Fines*, are few in number; and those belonging to church lands, or life estates.

"In Glamorganshire there are some leases for three lives; half fine, half rent. For instance, a farm of 100 acres value 100*l.* a year; the reserved rent to be 50*l.*; and the fine, at twenty years purchase (the present average value of a three-life lease) reckoning it as an annuity certain, at the discount of five per cent. compound interest, to be 623*l.* After the expiration of these kind of leases, they are seldom renewed. They partake too much of the nature of a lottery; and the calculation of the amount of the fine is, in general, too intricate for a farmer."

3. *Leases for Three Lives* are universally reprobated, though still in existence in several of the counties. To the three lives is sometimes added the life of the survivor, whether landlord or tenant.

"This tenure *for lives* appears to be particularly objectionable, on principle, and on account of the miserable aspect that many of the estates, thus held, bear in this county (Glamorgan). It seems to be as much too confidential as the tenure at will is too transitory. There is no rule given for cultivation; nor, in many cases, any sought after, or practised, than what will secure the tenant's mere maintenance. He loses sight  
of

## LEASES.

that relation which he bears to surrounding society, and which is so happily promoted by leases for terms of years. Secure in his possession, he grows indolent in the enjoyment of it; and by failing to cultivate his trust, negatively injures society, and impairs the interest of his successor."—*Mr. Fox.*

"A three-lived lease is the most preposterous that can well be imagined. In New Holland or Siberia, it might be proper, but not in an enclosed country. One may be inclined to grant a lease to a sober industrious farmer. When he dies, his widow may marry a slovenly drunkard, or his son may possibly be still worse. I would recommend a lease similar to that sketched by Mr. Marshall, that is, perpetual and terminable every three years, on three years notice being given."—*The Rev. T. B.*

Some leases for lives on the Duke of Beaufort's, Marquis of Bute's, and Sir Charles Morgan's estates, in the counties of Brecon and Glamorgan, have particular clauses, "according to the custom of the manor."

*4. Leases for Terms of Years, from three to twenty-one.* Leases for twenty-one years are commonly expirable at the end of each period of seven years, on either party giving six months' notice: in some twelve months' notice is required. These leases are now becoming more common than any. The greatest objection to twenty-one years' leases terminable every seven years, is, that they are only nominally for twenty-one years, whereas, in fact, they are only seven years leases. To which it may be replied, that the advantage is seldom made use of on the part of the landlord; and the seven years termination may, in some cases of dealing



letting, be more advantageous to the tenant than to the proprietor. There are nominal terms in other kinds of leases, such as those for ninety-nine years, provided the three lives named will endure so long. The ninety-nine years is only a trick of the lessor to play upon the fancy of the lessee: no such lease has ever been known to endure much above half the time; the general average not being above from twenty to twenty-five years.

There seems to be no end of opinions on the subject of leases. One prefers twenty-one years; another fourteen, on the ground that twenty-one years is of too long a duration for the landlord; but were the lease terminable every seven years of the term, as before hinted, this objection would be removed. One complains that tenants are apt to injure their farms the last years of the term; but this complaint was made in Radnorshire, a county bordering too close upon North Wales, for its land-owners to entertain any favourable opinion of the effect of leases. Tenants are aware of the disinclination of their landlords to renew leases, and act accordingly. Were the cause removed the effect would cease. In more southern or western counties, there is no dread of this degeneracy in the management of the farmer. He is generally the same, whether good or bad, from the beginning to the end of his term. His landlord gives him no occasion to be otherwise, as he expects a renewal of his lease when the present one expires.

*Repairs* are, by a clause in the lease, or by the general usage of the county, laid upon the landlord in Radnorshire and Glamorganshire. In the counties of Caermarthen and Pembroke, they are commonly and imprudently laid upon the tenant. Mr. Hassall's sensible remarks on this subject are included in the former Section

tion on Farm-buildings. In Brecknockshire, and several parts of other counties, they have begun to compromise matters, by dividing the expenses; the landlord to find materials, and the tenant carriage and workmanship. This is still too heavy upon the tenant, especially if he be poor, and the carriage of materials from a distance. All new buildings, or even parts thereof, should be completed entirely by the proprietor, carriage excepted, and the tenant to be charged a percentage on the amount, as an addition to his rent. He can afford to pay interest, when he cannot possibly procure the principal requisite to be expended in making his buildings either comfortable or convenient.

Some proprietors, or their agents, advance the percentage to be laid on the tenant in addition to the value of the land, for buildings or other improvements, to six and seven pounds, or more, for every hundred pounds laid out. Mr. Hassall makes a very just distinction between expenses in building on a farm, and those in building in a town, &c. His words are these:—  
“It is a maxim pretty generally admitted, that a gentleman of landed property cannot lay out his money to so much advantage any where, as upon his own estate. Would it not then be a most laudable thing in landlords, to furnish their farms with proper and convenient buildings, to enable their tenants to make the most of the produce of the earth? For all monies expended in this way, the tenants could well afford to pay five per cent. interest, in addition to the rents they now stand at; *and the landlord should be satisfied with that addition*, as he would receive the utmost present value for the use of his money, and the estate would increase in value yearly by the benefits resulting from the improvements produced by the buildings. It is a mistake  
some

some landlords fall into, to calculate from buildings of this kind the same rate of interest as if they were to erect a house in a town, where no possible advantage can arise beyond the rent the house will let for. In such situations the interest must be calculated at a higher rate, because the house is a perishable property; but the necessary erections upon a farm occasion the future improvement of the soil; and the proprietor is ultimately benefited there in as great a degree as the tenant."—*Pembrokeshire*, p. 57.

5. *Leases from Year to Year*.—In many places the tenants are summoned together to re-take their farms, and sign printed leases, which are only from year to year, containing prescribed rules of management for all kinds of farms and soils, without distinction. The tenant pockets the lease, pays for it, and then never troubles himself any more about it, until he is summoned again, after having notice to quit, to advance his rent, and sign another lease of the same edition, for the same purpose, and to the same effect.

6. *Leases for Twenty-one Years*, commencing at a rent lower than the valuation, and advancing yearly during the term. On such leases we were favoured with the following communication from Sir Edward Hamilton, of Trebinshun House, in Brecknockshire.

"My lease tenants enter their farms at a rent somewhat under value, and advance one shilling per acre per annum for twenty-one years. I permit them to act discretionally, in draining, altering, &c. &c.; confining them only to green and white crops alternately, with permission to quit the premises whenever they please, short of the twenty-one years, on giving twelve months notice. The advance falls short of the increase  
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of the times ; but my tenants double the value of their farms, by their improvements and expenditure ; and have the satisfaction of a certain home, at a certain rent, for twenty-one years. I am convinced that lands, tenants, and landlords, would be benefited by such leases."

Penry Williams, Esq. of Penpont, in Brecknockshire, in a set of leases newly granted, has resorted to the *coup de main* (to try whether an improved system of tillage can possibly take place) of restricting his tenants from taking two white crops in succession ; but always to introduce an ameliorating or green crop after every crop of grain. His tenants in the vallies of the Usk, the Brân, or the Esgair, will, in a given number of years, have occasion to thank their landlord for imposing this restriction ; but whether it can be able to overcome not only the prejudices of the oat-cropping farmers, but also the peculiarities of soil and climate, in the uplands of Llywel, time will discover.

The common covenants and restrictions in leases, vary little in general from those already published and known.

Some landlords bind their tenants to extraordinary quantities of lime, as much, we have heard, as fifty crannocks (four hundred and fifty Winchester bushels) an acre. Some landlords covenant to pay for a certain quantity of lime at the kilns, the three first years of the term ; and the tenants bound to carry the same quantities during the three last years.

T. Johnes, Esq. M. P. for Cardiganshire, in leases granted some few years back, covenanted to pay for the first year's lime at the kilns, and the tenant to continue yearly the same quantity to the end of the term ; when, if the tenant did not continue by taking a new lease, he was to be allowed for lime carried the last year ; and even



even half the cost at the kilns for lime that had produced two crops. If the tenant carried, during the last year, more than the stipulated quantity, he was to be paid for the carriage of the overplus, as well as the prime cost of the whole.

Premiums to tenants for improved culture, given by their respective landlords, will be noticed in the Section on Agricultural Societies.

Landlords, in some instances, in granting leases, agree to pay half the expense of quickset fencing; and to pay for cutting drains, the tenants to fill the same.

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#### SECT. IV.—TIME OF REMOVAL, OR OF ENTRY ON FARMS, ON CHANGE OF TENANTS.

In Brecon lower Division and Glamorganshire,—*Candlemas*, on the 2d of February.

In Brecon middle Division, and Radnorshire;—young clovers to be surrendered for preservation, on the outgoing tenant being paid for the quantity of seed sown in November;—stubbles to be ploughed, and gardens, &c. the 1st of February;—land in general, excepting boosey pasture, the 25th of March;—House and all the 1st of May.

In Brecon upper Division, the counties of Caermarthen, Cardigan, and Pembroke, *Old Michaelmas Day*; the outgoing tenant to leave stock behind him to eat the winter fodder. Some tenants carry it away with them. Both these customs are inconvenient; therefore it is a common practice to have the fodder valued, and an exchange or transfer takes place,—from A to B, from B to C, &c. This custom of removing at Michaelmas

Michaelmas appears inconvenient, on account of the winter fodder for stock; in other respects, it is the most convenient time for the tract, in general, where it is practised: lent grain being the general crops, removing at May would interfere too much with the barley seedness. However, were removals more frequent, and green winter-feeding crops more common, Michaelmas would be the most inconvenient time of quitting a farm in the whole calendar.

#### SECT. V.—CLASSES OF FARMERS.

1. *PROPRIETORS of large Estates.*—Not very many years back, the study of agriculture was confined to a class of men, consisting of persons of moderate fortunes, and some enlightened individuals of inferior rank. If a Nobleman, consulting the good of the community, and addicted to the rational enjoyment of a retired life and exalted rank, made experiments in cultivating the various and useful tribes of the vegetable kingdom upon his own demesne, he was looked upon, by his equals on the court calendar, as degrading his high station in life. At length, some illuminating star arose above the horizon of Britain; and wherever it cast its first benign influence, the patriotic principle disseminated itself far and wide, even to the extreme corners of the united kingdom; and the time, it may be hoped, is not far distant, when the indolent, the ignorant, and the profligate part of this superior class, will find themselves, upon an agricultural division, to be very much in the minority.

There is not at present a county without the presence of some such proprietors, combating the prejudices of their uninformed tenantry, by every means in their power,

power, either by example of improved culture,—by precept,—by publications,—or by premiums; and wherever there is a large tract of country destitute of these ornaments of rural society, there the face of Nature remains in *statu quo*, every thing is either dormant or languid. The agent transmits the paltry rents to the distant landlord; and the unthrifty tenants are not interrupted, one year after another, in the repetition of the exploded practices of the former centuries.

Though it may be useless, and even presumptuous in us, to offer any advice to our superiors, yet we may humbly state our opinion, that these great farming proprietors should not monopolize the management of too extensive a tract; and if they take into their hands a farm or two, in addition to the demesne attached to their mansions, may it be only for the sake of improving them, and then letting them out to tenants. We believe it will be allowed (without derogating in the least from the agricultural science of such great proprietors, for we have other well-known grounds to stand upon) that a tenant will produce a greater variety of articles, and more of each in quantity, for the supply of the markets and of the public, from a farm of three or four hundred acres, than a proprietor, such as we treat of, can do, or cause to be done, from a farm double the size. We rest our argument upon a general average, always admitting exceptions to general rules.

2. There are, however, persons brought up to higher avocations, who by some eddy or other in the tide of life, are now devoting the whole of their time and talents to rural pursuits. They have very superior agricultural knowledge, connected with bold experience. On their farms we find systems and managements highly

worthy not only of notice, but also of imitation. It is to be hoped that their bright examples will produce very desirable effects on the agricultural practices of their respective neighbourhoods. These gentlemen of penetrating understandings will adapt their systems of improvement to their own soils and climate, &c. and not to those of Norfolk, or of any other widely differing district in any part whatever of the island of Britain. There is a systematical regularity in all the proceedings of this class of farmers. Their pages of debtor and creditor, of expense and profit, are as correctly kept as those of any banking-house in the metropolis. That their supplies to the markets, and their own consequent emoluments, are very considerable, may be collected from an instance, which he believe to be correct, that one of these gentlemen, from the crop of one year, which must be owned to be a year of extraordinary dearth, supplied the Bristol market with wheat to the amount of 4000*l*.

3. *Book-Farmers*.—By these we mean the “acrials” of Marshall; those who know agriculture only by reading about it. Theory is their *ne plus ultra*; as they generally grow tired before they are much acquainted with practice. The practice of the country they come to reside in, is all wrong, and the inhabitants all savages. They bring ploughs and ploughmen generally from a distance; and when the master retires, the ploughmen return, and the ploughs are laid aside. They hold the farmers of the old school, as they call them, in sovereign contempt, who, in return deride their puerilities, and, in their own quaint phrase style their ineffectual attempt to establish a system improved agriculture, “*a flash in the pan*.” The



So considerable good in the vicinity they dwell in by employing labourers; and by their imported implements they open the eyes of mechanics. Most of the harm they do is to themselves. They injure others mostly by an exorbitant advance in the wages of servants, especially of such as pretend to be farm-bailiffs. They give double the wages that the old established farmers in the best cultivated counties, Salop or Hereford, &c. will give. They have generally very exalted notions of the value of land, and the powers of soil. They read of the high returns of crops in England or elsewhere, and calculate thereupon the value of land in the uplands of Wales; which, if they have farms to let, makes it extremely difficult to deal with them. Their opinion of manure depends on the book they have read last. If Jethro Tull is their favourite author, soil requires nothing but ploughing and stirring. With A, *lime is every thing*; with his brother B, only a few miles distant, and on the same kind of soil, *lime is nothing*.

4. *Farmers of the old School*.—These might be classed into numbers, first, second, and third, &c.; their attainments in agricultural science, being in proportion to the means of information afforded them within their own circle of observation. Accordingly, the farmers of one part of the district may be said to have been brought up in better schools than those of another part; that is, they have had superior examples of improved culture, *attended with profit*, laid before their eyes; and the most effectual teaching of all, they have been bribed with high premiums for turnips, vetches, alternations of green and white crops, &c. either by their landlords, or agricultural societies;

otherwise they are all the sons of the same Adam, obstinately attached to the old beaten paths of their ancestors. In recommending to them the advantage of a change of system, rotation of crops, &c. they stand nearly as much upon demonstration as a fastidious mathematician; adhering strictly to their own acknowledged axioms, and leaving the study of chances and minor probabilities to persons of more airy notions. However, among them may be found numbers of intelligent discerning men, who occasionally launch out of the beaten track, and follow the examples of their superiors with a slow, though prudent step; and in one point, that of maturely balancing expense and profit, they will be found in general to be better calculators than those who make a greater flourish.

5. *Rural Artificers.*—*Masons* in the building-stone tracts, are very expert, doing their work neatly and firmly; but in many other places, they seem not to be sufficiently acquainted with the properties of lime, and the method of combining it with sand, to make good mortar. There is an old Welsh adage—*Gwaeth waeth saer maen, gwell-well saer coed*; that is, according to Mr. George Owen's interpretation (*Cambrian Register*, ii. 96), "masons grow worse and worse, and carpenters better and better." This adage must have originated from a comparison of the very different degrees of hardness between the mortar cement in the ruins of the old castles and that in modern buildings. Carpenters, smiths, wheel, and ploughwrights, &c. are of all varieties, good or bad, according to the state of mechanical science in the tract of country they live in. Some self-taught geniuses prove a great aptitude to handicraft, &c. A self-taught dry-wall

wall mason in the mountains of Glamorganshire, became the first rate bridge builder in Britain\* : a village carpenter became the first engineer at Merthyr Tudful† : a common mechanic, in Cardiganshire, made carding machines upon the Yorkshire model, from hearing a verbal description of them only, without ever seeing any kind‡. Some small farmers in the mountains bring to our mind the patriarchal age, before division of labour took place, when every article of iron, wood, or leather, was manufactured by every family for its own use.

6. *Labourers in Husbandry.*—The hand-reapers of Glamorganshire, the swiving-reapers of Cardiganshire, &c. and the cradled scythemen of the Vales of Towy and Usk, perform their respective modes of cutting grain with dexterity and dispatch. The corn stack or rick makers in the Vale of Glamorgan, surpass those of most other counties; indeed for temporary uses of this kind, their greatest fault lies in being too neat. The thatching labourers, in the same tract, are the first of their kind. The sod-mound fencers, and the framers of the alternate sod and herring-bone masonry of flat stones, in the western counties of South Wales, are masters of their profession. There is a neater proportion between work and wages than we are well aware of. Where labourers work by the day, on low wages, finding their own victuals, their expeditiousness is curtailed accordingly.

In a general view, artificers and labourers are a plain,

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\* See Malkin's Tour, 8vo. edition, vol. I. p. 132 to 148.

† Mr. Watkin George, now of Ponty-pool, in Monmouthshire.

‡ He lives on the Teivy, near Llandysul.



honest, industrious, and dexterous people; of gentle and tractable dispositions, addicted to no great, and not many vices; and in rural employments, they perform their work much better, in many places, than might be expected from the awkwardness of their implements, especially the plough.

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SECT. VI.—TITHES.

TITHES in this district are the property of lay-impropriators, corporate bodies, rectors, vicars, &c. Where tithes are farmed out by whole or entire parishes, they are generally re-let very high; but this is seldom the case where resident clergy are concerned. In some places they are raised in kind; in others a composition or modus is paid. We found in one tract, “1*d.* for hay, 1*d.* for garden, and 1*d.* for smoke.”

Commutation is the general cry. “It is a consummation devoutly to be wished. The future state or permanency of the established religion depends upon it. A rector or vicar exacting nearly his due, will find his church deserted, without any communicants, at best very few.”—*W. W. Esq.*

“There are some violent complainants against tithes, whom it would be impossible to satisfy. Such who are land-owners, forget that they purchased their estates cheaper by reason of the tithes being issuable; tenants also forget that they take their farms at a cheaper rate on the same account.”—*J. Bishton, Esq. Original Report of Salop.*

“The permanency of the title to tithes rests upon the same basis as all other estates in the kingdom. How  
idle

idle the various schemes proposed for fresh regulations! Some thoughtless farmers take farms without ever thinking that one-tenth of the whole produce of such farms are private and distinct property; and consequently set their faces against the clergyman, as one who exacts an extortion from them."—*Nath. Kent, Esq. Report of Norfolk.*

"The laws of England are, in point of honour and justice, extremely watchful in ascertaining and protecting the *right of property*. In vain may it be urged that the good of the individual ought to yield to that of the community; for it would be dangerous to allow any private man, or even any public tribunal, to be judge of this common good, and to judge whether it be expedient, or not. Besides, the public good is in nothing more essentially interested than in the protection of every individual's private rights, as modelled by the municipal law. In this and similar cases, the legislature alone can interpose and compel the individual to acquiesce. But how does it interpose and compel? Not by absolutely stripping the subject of his property in an arbitrary manner; but by giving him a full indemnification and equivalent for the injury sustained; and even this is an exertion of power, which the legislature indulges with caution, and which nothing but the legislature can perform."—*Judge Blackstone on the Right of Property.*

"*Chief-rent* to the lord of the manor; *tithe-rent* to the proprietor; *tax-rent* to government, &c. are, in fact, all paid by the landlord; and were either tithe-rent, or tax-rent, or both together abolished, the tenant would not be eased of his burthen. All the change he would experience, would be the reduction of the number of his landlords, not of the rent paid; paying to  
one

one landlord, or two landlords, instead of three, without having the aggregate rent reduced."

The remaining items of this Chapter on the Mode of Occupation, according to the prescribed Plan of the Reprinted Reports, are—1st, Poor-rates, and 2d, Expense and Profit. As to *Poor-rates*, we think them too intimately connected with the subject of the seventh Section of Chap. XV. on Political Economy, to be treated here separately. As to *Expense and Profit*, we can only say, that on poor farms, poorly managed, the expense is small, and the profit still smaller. On good farms, well managed, the expenses are considerable, and under a gradual increase, whilst profits on the same are fluctuating, rising and lowering with the produce, demand of markets, &c.; and withal, we have not been favoured with data that may warrant us in laying them before the public.

## CHAP. V.

## IMPLEMENTS.

## SECT. I.—PLOUGHS.

THE ploughs of the district may be divided into three classes :

1. The old Welsh plough.
2. The old Welsh, or long plough, improved.
3. Modern ploughs, of all descriptions.

1. *The Old Welsh Plough.*—Were antiquaries wishful to know the construction of the original plough first brought over to this island by *Hû Gadarn*, and his colony of primitive Britons, they could not, it is presumed, be referred to models of greater antiquity, than those still in use in a great part of the *Dimetian* counties of Cardigan, Pembroke, and Caermarthen. In the Original Report of Pembrokeshire, p. 18, Mr. Hassall has been so happy in his technical terms of description of this plough, that we shall copy his words.

“The Welsh plough is in common use; and perhaps a more awkward, unmeaning tool, is not to be found in any civilized country. It is not calculated to cut a furrow, but to tear it open by main force. The share is like a large wedge; the coulter comes before the point of the share sometimes, and sometimes stands above it; the earth-board is a thing never thought of,  
but

but a stick (a hedge stake or any thing) is fastened from the right side of the heel of the share, and extends to the hind part of the plough: this is intended to turn the furrow, which it sometimes performs, sometimes not, so that a field ploughed with this machine, looks as if a drove of swine had been moiling it."

Were any further description necessary, it might be supplied from the Original Report of Cardiganshire, p. 28:—"The cradle of the plough is of unusual length, measuring, including an ill-made blunt share, at least five feet. The mould-board is only a round piece of wood, about seven inches in circumference. In working, not half the cradle touches the ground. The tail is continually held up by the ploughman, by short awkward handles; and when best at work, it is held in a very oblique position."

"Even with such tools, some peasants make better work than could be expected."—*Mr. Hassall.*

With all the odium cast upon this implement by its describers, yet those who use it in preference to any other, may plume themselves with the idea, that they now use a plough the very *fac simile* of that described by Virgil nearly two thousand years ago. The annotators of Virgil, wishing to make his plough excel as much as his verses, have decorated it with wheels and two earth-boards; and compare it with ploughs used in the neighbourhood of Mantua at this day. Jethro Tull, who had travelled in Italy, and it may be presumed with the eye of a critic in rural mechanics, absolutely denies such complexity of machinery to the plough of the Augustan age, grounding his opinion both from Virgil's description, and from the awkward simplicity of the ploughs actually used in Italy in his time.

We shall here insert the several parts of Virgil's plough as it was in the year 35 before Christ, opposite to those of the old Dimetian plough now used in the year 1812, to shew their identity of construction.

<i>Latin.</i>	<i>Welsh.</i>	<i>English.</i>
<b>Baris.</b>	Llaw haeddel. Corn aswy.	Left handle or stilt.
<b>Temo.</b>	Llyw-Arnodd.	Beam.
<b>Binæ aures.</b>	Dwyglust.	The muzzle, literally <i>two ears</i> , one vertical to appor- tion the depth, and one ho- rizontal to regulate the width of the plit. The muz- zle is still called in Welsh <i>clust aradr</i> (auris aratri) the plough ear.
<b>Dentalia.</b>	Cywair, gwadn, cledden, cebystr.	The sole, foot, spindle, and pins, connecting the " <i>du- plici dorso</i> " of the two han- dles, or of the sole and beam.
<b>Stiva.</b>	Brân, chwelyd, dym- chwelyd, hegl gam, styllen bridd.	The wrest, or plough-staff, wresting out the plit, and bending round the base of the cradle ( <i>currus</i> ). The <i>hegl gam</i> , or right handle, acts also as a <i>stiva</i> to wrest out the plit; and, as Ovid expresses it—" <i>Stivâ in- nixus arator</i> ," for the plough- man to rest himself upon.

The *baris*, or main handle, is said to have been made of elm. Had the British Romans such veneration for Virgil, that they continued here to make their plough handles of elm, as the common elm (*ulmus campestris*) is still called in some parts of South Wales *Llwyfan Rhufain*



*Rhufain* (Roman elm) to distinguish it from the aboriginal or Wych elm (*ulmus montana* ?) Williams, in his History of Monmouthshire, questions the indigenoussness of *elm* among other trees, &c. Did he ever observe the Wych elm growing numerously in dingles and on rocks, inaccessible to man? He probably meant the *campestris* only.

2. *The old Welsh, or long Plough, improved.*—Such a simple and truly original sketch of a plough, as we have last described, could hardly be expected to remain long without undergoing an improvement. Accordingly we find it in an improved state, and in use from time immemorial among the Silures of Brecknockshire and Glamorganshire, from whence its use extended into Radnorshire, the best cultivated parts of Caermarthenshire, and to Castle Martin hundred, in Pembrokeshire. Mr. Hassall considers it as of modern date in the latter place, and pays a compliment to the introducers thereof, by saying,—“Some intelligent men in Castle Martin hundred have, however, improved the old plough with success, by adding a wing or fin to the share, and an earth-board; and I have seen such work done with these improved ploughs, as would not disgrace any country.”—Of the performance of this same kind of plough in Brecknockshire, Mr. Clark, who is seldom guilty of lavish praise on Welsh agriculture, says, in his Report of that County, p. 15,—“Every ploughman here is perfectly master of the *straight line*; for every ridge runs mathematically true.” At p. 54, Mr. Clark adds,—“A county to the west, offers annually a premium of *ten guineas* to any of their farmers’ servants, who will go and reside for three



three years in Brecknockshire, and there learn to hold the plough."

The Silurian long plough is generally about thirteen feet and a half in length. The improvement on the old Dimetian plough consisted in adding a sharp pointed share with a fin to cut the furrow instead of tearing it; a straight mould-board from three to three feet and a half long, to press the mould or furrow to the right; and a *chwelyd*, or round piece of wood, gradually rising from the base, and gradually projecting from the mould-board to turn over the plit.

Since the introduction of the modern short ploughs, the long plough has been generally considered as a sure mark of either ignorance or obstinacy in those who persist in using it. It has, however, its advocates, and those among impartial judges, who use both kinds occasionally on their farms, as circumstances require. "Its superiority," they say, "consists in its not being so easily jolted out in strong soils, sideland grounds, &c. in sowing wheat, &c. under furrow of a fallow, on flat winter wet lands; as it lays a narrower plit, covers the seed better, and clears the reans between narrow three-bout ridges, in a very neat manner, in collecting less soil into the headlands, &c." The points in which it is inferior to the short lock-ironed plough, is in rooty strong lands and leys. Those who hold it in derision, say it must be difficult of draught, by reason of its extreme length, and consequent friction or resistance. "This objection, however," its advocates say, "is more apparent than real, as may be proved by demonstration. The soles or bases of both ploughs, form a kind of right-angled triangle. The left, or land side of the sole, forms the *perpendicular*; the heel is the *base*; and the hypotenuse, or cause of resistance in draught,

draught, is a line drawn from the point of the share to the upper corner of the mould-board. It follows, that the plough, whose hypotenuse line makes the most acute angle with the base, or width of the heel, gives the greatest resistance to the draught, which happens to be the case with the short plough in a greater degree than with the long plough, as the annexed figure will explain :—



the black line  $b, e$ , being the hypotenuse, or resistance to the draught, in the short plough; and the dotted line,  $b, c$ , in the long plough. Whether the principle of operation in these ploughs be a wedge, or an inclined plane, makes no difference, if there be any essential difference in the terms. Call the principle a *wedge*, then the thicker it is, in proportion to its length, the greater force it will require to be put in motion. Call it an *inclined plane*, the less steep or abrupt it is, the easier will be the draught, or, which is the same thing, the less will be the resistance."

The above comparison between the resistance to the draught in the two kinds of ploughs, does not seem to be correct. The base or rather sole of the long plough, owing to the straight mould-board, is a right-angled triangle; and its hypotenuse projects a certain resistance to the draught, by an uniform lateral wedge, without any abatement, the whole length of the mould-board being about three feet. The curved iron mould-board of the short plough has a very different effect; it takes

takes the plit from the share, carries it as an under wedge but a very few inches; and, owing to the proper curve, the plit is immediately brought to that position that it must fall in a reversed state of its own accord, where the resistance to the draught immediately ceases; so that it may fairly be inferred, that the resistance given by the mould-board of a well constructed modern plough, is not one-half, if any above one-third, of that which would fain be represented by the foregoing sketch, wherein the triangle *a, b, c*, delineates the sole of the long plough; and *a, b, c*, the pretended sole of the short plough. In the latter case the dimensions are not fairly taken, and consequently the conclusion drawn therefrom must be incorrect. Instead of taking the hypotenuse from the point to the *upper* corner of the mould-board, it should be taken to the *lower* corner; and then the sole of a short plough would be represented by the triangle *a, d, e*, which shews a very faint resistance indeed to the draught. The breadth of the heel, or the base of the triangle, should not in any swing plough be above eight inches. On Trebinshun Farm, in Brecknockshire, and few other places, the soles of the ploughs are still narrower. "The narrowness of the sole is certainly an advantage in the draught; and the angle or curve of the mould-board useful, at the discretion of the ploughman, who is not necessarily obliged to lay the plit *too flat*. In autumn or winter ploughings, I recommend the plit being inclined very little from the perpendicular."—Sir Edward Hailton.

The formation of the American mould-board, recommended by President Jefferson, seems to be too mathematically complex to be of any use in Britain, excepting in the store-room of the Society of Arts.



*Improvement in Ploughs* is very difficultly introduced.—Many disputes have arisen between masters and servants respecting ploughs; the latter being inveterately attached to the ploughs to which they have been accustomed. A gentleman, a naval officer, in Cardiganshire, introduced the light Rotherham, and insisted on his ploughmen using them. As soon as he turned his back, the new ploughs were dismissed the service, and the old ones were brought into the field, which one day, in a rage, he committed to the flames, and set the new ploughs a-going. Afterwards taking a ride to cool himself, and returning, he found the new ploughs in the ditch, and old ploughs borrowed from the neighbours at work: the master then thinking it useless to persevere, gave up the contest. "I have," said he, "seen various kinds of human beings, in different parts of the globe, from latitude 10 to latitude 54, but none so obstinately bent on old practices as the Welsh."

H. Lewis, Esq. of Galt y Gog, near Caermarthen, introduced the sort whip-rein ploughs upon his farm. He did not, like the gentleman above mentioned, burn his old ploughs; but he locked them up, that the servants could have no access to them, excepting for side-land grounds, &c. in which they were preferable. However, finding the trouble with servants more than agreeable, he has of late contrived such an alteration in the construction of the long ploughs, as to bring them nearer in principle to that of more modern and approved ploughs, and at the same time, by a gradual introduction of improvement, keep the ploughmen in better humour. He flatters himself he shall be able, by degrees, to bring about an entire revolution, unawares

to the sturdy peasantry, who are so jealous of innovation in any of their ancient practices.

3. *Of Modern Ploughs.*—That which has obtained the earliest trial, the greatest circulation, and most general credit, is the well known implement, called the *Rotheram-swing*. With little or no variation of construction, it goes by different names in different parts. In some parts of Glamorganshire it is called the *North Patent*; in Brecknockshire, and parts adjacent, it is called the *Whitchurch* plough; in other parts, the *Crickhowell* plough, from the town of that name, where an excellent artist, Thomas Davies, employs six wrights, and three smiths, in supplying the demand of the country with all kinds of implements in husbandry. This swing plough found its way from its native place in the north of England into North Wales, about the year 1760; but owing to want of communication between the two departments of the Principality, or other causes, it was scarcely known in South Wales till about the year 1790; and since that time, its use is, year after year, becoming more and more general. Patriotic gentlemen, encouragers of every species of improvement, have introduced expert plough-wrights into their respective neighbourhoods. One from Scotland, recommended by Dr. Anderson, came and settled near Havod, in Cardiganshire; another, near Llangoed Castle, in Brecknockshire.

In the least improved parts of South Wales, the average price of these ploughs is about three pounds. In Montgomeryshire, two ploughs were procured for John Mirehouse, Esq. of Brownslade, in Pembrokeshire, completely geared, at two pounds each; and four more, of lighter materials, for one pound seventeen shillings and six-

pence each. The Dimetian old plough, according to information at Abermaid, cost from fifteen shillings to twenty-one shillings. In Brecknockshire, the Rotherham is lower, and the old long plough higher in price than in most other parts of South Wales; the reason whereof seems to be the following: in some parts, only one expert artist is to be found in a tract twenty or thirty miles in diameter: he has no rivals, and exacts his own price accordingly. In Brecknockshire, &c. rivalry between numerous makers occasions the selling of the best finished ploughs for about forty-five shillings, whilst the old long plough, made by the same hands, on more mathematical principles than formerly, and with neater workmanship, sells for about thirty shillings, and from that to two pounds. Cast-iron mould-boards, of any pattern, are here very conveniently procured, by the canal, from the iron foundries of Monmouthshire.

The following dimensions of the best constructed ploughs, of both kinds, in Brecknockshire, may be of service, either to be corrected, if necessary, or to serve as samples for the plough-wrights of other parts of the district, which are as yet far in the back ground.

No.	Long Plough.		Short Ploughs.					
			1st.		2d.		3d.	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
1. Whole length of wood .....	13	6	11	0	10	6	10	6
2. Length of beam .....	7	6	7	0	6	10	6	10
3. ——— of left hand stilt .....							6	3
4. { Sole, rest, or cradle .....	2	9	1	8	2	0	1	10
{ ——— more in iron, share .....	1	3	1	1				
5. Ditto for two horses abreast .....					1	11		
6. Height under the curve of the beam .....	1	3	1	2	1	3	1	5
{ beam .....	1	8						
7. Ditto under its fore point, single draught .....	1	1	1	1	1	1	1	2
{ draught .....	1	7						
8. Ditto under for horses abreast .....					1	5		
9. Width of the heel, over the irons ..			0	9	0	10	0	8
10. ——— between the points of the stilts	2	3	2	0	2	1	2	4
11. Height of left hand stilt from the ground .....	3	0	3	0	2	6½	3	0
12. Bias, or bent of the beam to the right for single draught, double, less ..							0	8
13. Length of mould-board .....	3	0						
14. Angle of the round 'chwelyd from the base .....	0	4½						
15. Projection of ditto from the mould board .....	0	2						
16. Length of spindle, or foot .....	2	0						

*Observations, &c.*—No. 1, the plough complete, excepting irons. No. 6, the height under the beam, at the point where the spindle or foot connects the beam and sole. The ploughs 2 and 3, seem too low, especially in ploughing stubbles. Plough 3, of seventeen inches depth, will more readily dispose of rubbish, &c. No. 9, width of the heel. Plough 2, is at least two inches too wide; it may do for fallowing, or for seed furrow in light soils, such as the majority of the Vale of Usk; but in stronger soils it turns the plit too flat.



pence each. The Dimetian old plough, according to information at Abermaid, cost from fifteen shillings to twenty-one shillings. In Brecknockshire, the Ro-theram is lower, and the old long plough higher in price than in most other parts of South Wales; the reason whereof seems to be the following: in some parts, only one expert artist is to be found in a tract twenty or thirty miles in diameter: he has no rivals, and exacts his own price accordingly. In Brecknockshire, &c. rivalry between numerous makers occasion the selling of the best finished ploughs for about forty-five shillings, whilst the old long plough, made by the same hands, on more mathematical principles than formerly, and with neater workmanship, sells for about thirty shillings, and from that to two pounds. Cast-iron mould-boards, of any pattern, are here very conveniently procured, by the canal, from the iron founderies of Monmouthshire.

long ploughs are beat on the plain, let them shift their ground, and challenge their opponents to the side-lands. Then let competent judges strike the balance; whether the advantages or merits are all on one side, or whether they must be divided, and each plough be permitted to occupy its proper province. We are no advocates on either side, though it is very apparent that compactness, and consequently strength and duration, exclusive of execution in the field, are on the side of the Rotheram. The gentleman before alluded to, who has condescended to improve the construction of the long plough, to humour the bigotted attachment of his countrymen in the Vale of Towy, says, "of ploughs, I prefer the Rotheram swing, which is gaining ground here; price complete, 3*l*. Our old plough costs but 30*s*.; but one Rotheram will last three of them, and perform its work much better."

Small's improved Rotheram has been introduced many years ago by gentlemen, into most parts of the district.

*Whip-rein* ploughs, for two horses a-breast, are becoming more and more common. The saving of a boy's wages and provisions, and the keep and wear of a horse or two, for every plough employed, is such an argument, that even common farmers are able to comprehend, though they may appear tardy in adopting so obvious an improvement, especially in a tract so perfectly level as the Vale of Glamorgan, &c. A Mr. Gale, who held a farm of 800 acres in that Vale, a few years back, ploughed 250 acres a year, upon an average of the three last years of his holding, with five ploughs, five men, and ten horses. His observation was, "the wages and provisions of five boys to  
o 4 drive,

drive, were saved towards furnishing the ten horses with corn.

"It is surprising to me, that farmers will persist in using three and four, and even five-horse ploughs: the convenience to the ploughman of a boy to attend on him, is certainly very great, and tends probably to keep up the reprobable custom."—*Sir Edward Hamilton.*

A question occurs—Were this non-boy-driving system to become in any degree general, how would poor boys, in a country purely agricultural, without manufactures, be disposed of, until they come of age to do other work? Would it not advance the poor-rates, already enormously high? *Answer.* \*\*\*

Whip-rein ploughs are of two sorts: one has the footing chains hooked to a vertical muzzle, moveable to the right or left on an horizontal wooden cop, fastened on the point of the beam; the other has a long chain passing through a vertical muzzle under the beam, and hooked to a staple above the coulter. An ingenious plough-wright is now preparing a third, which he is positive will be superior to both, for two horses a-breast.

*Double-furrow* ploughs are used in several places, for expedition in fallowing, &c. Two of them are frequently used upon the same farm. Upon fallows, in dripping seasons, they are found convenient in ridging the land into single bouts, so as to be quicker dried by sun and air, than a level surface.

*Dutch Ploughs* have been introduced upon Laugharne Marsh in Caermarthenshire, and Castle Martin corse in Pembrokeshire. Mr. Hassall's description of it is, "a broad wing or firm share, with a long taper point, circular traversing coulters, curved earth-board, single



single tail, and a sliding gauge to the beam, to regulate the depth of the furrow, with a swivel at the point of the beam, to regulate the width."

Most of the Rotheram ploughs have very open mortices in the beams, in which the coulter are fixed, so as to admit several wedges on all sides, to regulate the depth and breadth of the furrow. This may do for ploughmen who understand the regulating principle; but for others, who are always meddling, and at every attempt make the plough worse, the Crickhowell plough seems best adapted. This has the mortice in the beam, just fitting the coulter, with space only for one wedge to keep it tight.

*Road Ploughs* are not unfrequent in the lower division of Radnorshire, the adjoining part of Herefordshire, &c. Length,  $13\frac{1}{2}$  feet; sole, or rest,  $4\frac{1}{2}$  feet; mould-board,  $3\frac{1}{2}$  feet: same pattern as the field long plough, only that the wood and irons are more gigantic. It is used occasionally for forming new roads; but more commonly, in the spring of the year, to repair the damages of winter, on deep rutty roads, in clayey or loamy soils, not frequently gravelled. The existence of these ploughs gives a very intelligible report of the state of the roads in winter, of the nature of the soil, and the quality and quantity of covering materials laid thereon. See more of these Roads and Ploughs, in Chap. XV. Sect. 1, on *Roads*.

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#### SECT. II.—HARROWS.

THERE are no implements of greater variety, with so many of them nearly useless, as harrows. In many, the

the plan is bad, the draught wrong, and the time too much worn for execution. To such as these, Mr. Hassall must have referred, in Caermarthenshire, p. 18, where he says, "They do not pulverize the soil without excessive labour, and going over the ground ten or twelve times in a place." An inefficient ploughing generally lays the foundation of difficult harrowing. In the fine soils of the Vale of Glamorgan, upon the rag-lias, it is a general practice, on ley grounds, that two men or women follow each plough, with mattock-hoes in their hands, to chop here and there the surface of the furrows, as well as the omissions of the plough, to prepare loose soil for the harrows which follow them. This is troublesome, expensive, and a clear proof of defective team implements, and the management of them. A good Rotheram plough, laying the furrow at the angle  $40^{\circ}$ , followed by well-contrived and sizeable harrows, would obviate the expense of the mattock-men, which cannot well be less than from 2s. 6d. to 3s. an acre; and have the work done with quicker dispatch, and better effect. In the Vale, ploughing is performed either by oxen in yokes, or by horses singly. In harrowing, the drag is generally drawn by oxen, and the finishing harrow by two horses a-breast, with a boy mounted on one of them. The horses are frequently of very unequal size: when the hunter walks, the poney trots; and when the hunter trots, the poney must quicken his pace; so that the harrows, instead of steadily working the soil and covering the seed, are continually thrown about by the alternate jerks of the angles.

The general plan of a Glamorgan harrow is, two sides coupled of unequal sizes; the near side consisting of three bulls, and the off side of four. The time  
are

are frequently knife-shaped ; but as they are fixed with the edge in the direction of the bull, and the harrow drawn diagonally from a staple in the central bull of the near side, the tine must present their flat sides, and not their edges, to the clods. The bulls are generally straight, widening behind, for the obvious intention of disposing of the unreduced clods, and altering the tracks of the tine. The horses or oxen are always hooked to the near side, and that drags on its fellow by means of coupling-irons, generally similar to the hooks and eyes of hanged gates. In several instances, the sides are of equal sizes, three bulls or four, on each side : these latter, of four bulls, are drawn from a semi-circular plate fixed on the heads of the two central bulls of the near side. One of the best common drags we have seen in the Vale, was 5 ft. 4 in. long, 3 ft. 6 in. wide behind, and 2 ft. 6 in. before. The bulls were of oak, with four cross bars, one of wood, and three of iron ; five tine in each bull, and distance between them eleven inches.

Curved bulls is the general character of the Brecon and Radnor harrows ; of course some time is lost in search of crooked timber. The bulls of the near side curve towards the driver ; whilst those of the off-side curve reversely. The draught of these differ from that of the Glamorgans, in having the footing chains hooked to both sides, at a staple in the centre of each, the chains seldom differing any in length, so as to draw them diagonally. The dimensions of a pair upon the Wye, four bulls on each side, five tines in each bull : length, four feet ; breadth behind, three feet each ; breadth before, two feet two inches ; distance between the bulls and tine in the forepart, about five inches ; in the hinder part, between the bulls,



built ten inches, and between the sides, at the coupling, owing to the reversed curves, not less than eighteen inches. In the mountains of Brecon we saw strong harrows, five bulls to a side, five tines in each, of 2lb. weight, in all 100lb. exclusive of wood and coupling irons, drawn by four horses.

The draught of harrows is of three kinds: 1. From a staple or link, at the hither corner or center; 2. From two staples, &c. one at each corner or each center of the pair; 3. From a runner, changing corners, at every turning. In some places, the harrow is reversed, or the fore-end hindmost, to cover small seeds, and overturned, with the tine upwards, to pulverize compost manures on grass lands.

Gentlemen in every part of the district, have varieties of the modern advertised harrows; some performing their work well; others of the nick-nack kind, making their exits soon after their entries upon the stage of experimental farming.

"I have five *Lester* harrows, and they are the best ever invented. My six feet drag has thirty-six tines, ten inches long, twelve inches distant, fixed in the quincunx form; tracks of tine only two inches asunder. The five and four feet harrows are the same, on a reduced scale. The fault with our old harrows, in the Vale of Towy, is, that they do not go steadily, but jerk and collect the sods, exclusive of their track being mostly the same way. The execution of a *Lester* harrow, on one driving, is more than equal to two of our common harrows, and they penetrate the ground deeper."—*H. Lewis, Esq.*

"My *Lester* harrows have been broken; they will not answer on stony soils."—*J. Jones, Esq.*

## SECT. III.—CARS, CARTS, &amp;c.

THE primitive vehicles without wheels, are still in being in the steep mountainous parts, where no wheeled carriages can possibly approach. They consist of two kinds of cars, the *sliding* and the *dorsal*: the latter is the most common, with the shaft upon one horse, and the heels sliding along the ground. The scanty crops of hay and corn can be tolerably managed with them; but when they are used for carrying up manure from the yard to a distant field, the tillage, &c. of a few acres becomes very tedious.

The first improvement upon the primitive vehicles, seems to be the *wheeled car*. Its forepart slides along the ground, and under its middle is a pair of low wheels. It has a *long body*, and is sometimes called by that name, and conveys a good load from sideland places. It is more frequent in the lower part of Radnorshire, the Valley of the Tame, &c. than any other part we have noticed.

In the progress of civil society, and in the improvement of agriculture and mechanics, the old *Welsh cart* or wain became in use\*. Of this implement, Mr. Hassall, in Pembrokeshire, p. 19, says, "The Welsh cart is a bad one; but owing to the general narrowness

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\* "Within the memory of a person, now eighty years of age, there were only two carts in the parish of Penbryn near Cardigan: sledges or cars, were then the only carriages. They did little more than to convey some small quantity of dung to the adjoining spots. Lime was unknown, and sea-sand, the only distant manure, was carried on horseback. There are now in the same parish near sixty carts."—*Original Report of Cardiganshire*, p. 30.

of the bye-roads, they are confined in the length of the axletree, and are obliged to make the body of the cart too long for the breadth, which is found very inconvenient in an uneven country, and can only be remedied by a general widening of the roads."

Mr. Hassall here, with great deference to his general information upon rural affairs, seems to confound causes and effects. The roads of the Dimetæ of Cardiganshire, Pembrokeshire, &c. are not the cause of the narrowness of their carts, but the reverse. The original narrow carts, upon an axletree permitting only four feet three inches between the tracks of the wheels, in a long course of use, without much repairing of roads, made the latter impassable for carriages of any other dimensions: so that, in fact, the narrowness of the original carts, is the cause of narrowness of passage in roads, in the tract referred to. There is scarcely a bye-road, confined between fences any where, that is not wide enough, properly repaired, by levelling the ruts, &c. to admit the passage of carriages of the common or proper length of axletrees in other countries, or such as leave from 4 ft. 10 in. to 5 ft. between the tracks of the wheels: even were these wheels of 4 ft. 3 in. distance, made with a greater dish, that is, according to the mechanical phrase, more conical than cylindrical, the carriage laid thereon, with suitably bevelled sides, would contain double the loads they now do.

There was lately an apprehension, that the legislature would interfere in converting wheels, being sections of cones, into those being sections of cylinders, or without any dish. Various lengths of axletrees, suitable to size of carriages, and weight of loads, would probably be more conducive to the general reformation



tion of bad roads; as they must of necessity be always in repair, to admit the passage of different axletrees of such various lengths, and which could not possibly run in the same track.

The narrow Welsh cart above-mentioned, is described in the Original Report of Cardiganshire, in the following terms: "The carts are small and heavy; the wheels in height, 4 ft. 6 in.; buck or boss, in length, 5 ft. 10 in.; breadth, 2 ft. 10 in.; depth, 1 ft. 3½ in. It carries about 16 bushels, and is drawn by two oxen and two horses a-breast. The track of the wheels, 4 ft. 3 in. in the clear. For carrying hay, straw, faggots, wood, &c. a kind of car with a beam is used, in shape like the cart, but larger, open at each end, and not boarded. The same pair of wheels do for both, being shifted as occasion may require." This open unboarded car, is in use in other parts, in Radnorshire, &c. It is there called *gamboe*, or long-body, consisting only of the ground frame of a cart, with four poles, one at each corner, and a small railing on each side, opposite the wheels. A shaft is attached to it for single horses, or a beam for oxen in yokes.

We next come to vehicles of more modern date. In the progress of Agriculture, in the most cultivable tracts, it became necessary to have larger wheel-carriages. The state of the roads rendered it difficult to adopt a greater length of axletree; consequently Mr. Cumming\* seems to be right, that this gave rise to the formation of conical wheels with bended axletrees, affording a wider space between the top than the bottom of a pair of wheels, so as to admit carriages of wider

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\* See his Communication to the Board of Agriculture, on Wheel Carriages.

dimensions upon the same length of axletree. The carts, indeed, for three or four horses, are in many places too large, when full loaded, for the sake of the poor animals under the shaft or the pole; and more especially down hills. These large carts, as well as the waggons, are of two sorts; one with ripples for harvest work, &c. the other bull boarded for coal, lime, &c. The carts will take from two tons to 45 cwt. of coal, six score to the hundred weight, and the waggons from three tons to three tons and a half, or more.

A great variety of opinion exists, as to the superior utility of carts or waggons for the purposes of farming. In many parishes, in the hills, where twenty years ago only carts were to be seen, now almost every farmer, even of 40*l.* a year rent, has a waggon. Some very light ones are made for two horses. They are found safer in bringing loads of hay or corn from sideland places, where carts with half loads would scarcely stand. On the other hand, for teams of moderate strength, in carrying lime up-hill, carts have the advantage.

*Single-horse Carts* gain ground but slowly. They were introduced into the Vale of Towy, several years ago, by Lord Robert Seymour; into Cardiganshire, by Thomas Johnes, Esq.; and into Brecknockshire, by Sir Edward Hamilton.

“ My one-horse carts, and the harvest bodies to put on the same wheels, are certainly admirable things, and render waggons on farms quite unnecessary. I think the general introduction of them, would be both an improvement and a great saving; for with two carts, and two harvest tops, the whole harvest may be got in with two or four horses; whereas in the common method, two waggons, at an expense of forty guineas each, are kept on each farm, besides two carts for hauling

hauling out muck, &c. with at least three horses to each waggon. My carts, with harvest tops complete, cost twenty guineas each, and one horse is sufficient in most cases. No farm under 300 acres should keep more than four horses; indeed two, with proper management, is sufficient, provided there are no jobs. The Welsh farmers, in general, keep too many horses: fewer of a better sort would do their work."—*Sir E. Hamilton.*

In Glamorganshire, &c. both waggons and carts for harvest-work, have curved surboards over the wheels, similar to those in several English counties. Waggons of the Gloucestershire make, are here and there to be met with. In some instances, we observed a chain hooked to each end of the fore axle, and passing through a link under each side of the shaft, with rings at the ends, to which the second or pin-horse was hooked, instead of being hooked to the shaft, like the hind horse. This is supposed to be an improvement in draught.

Dimensions of a lime waggon of the middling size, in the Vale of Usk :

	<i>Fr.</i>	<i>In.</i>
Height of the hind wheel, .....	5	4
Height of the fore wheel, .....	4	2
Difference, .....	1	2
Height of chest base, hind part, .....	3	7½
Height of chest base, fore part, .....	3	4
Sweep, .....	0	3½
Length of chest, .....	11	0

Depth of bolstering to the centre of the axle.

Hind-end, .....	0	10½
Fore-end, .....	1	2
Balance of sweep, .....	0	3½
<b>S. WALES.]</b>	<b>F</b>	<b>Breadth</b>



	<i>Fr.</i>	<i>Ln.</i>
Breadth of the chest, fore-end at top, .....	3	4
————— at bottom, .....	3	3
Breadth of the chest, at the hind-end, top, ....	3	5
————— at bottom, .....	3	4
Depth of the chest, fore-end, .....	1	7
Depth of the chest, hind-end, .....	1	6

Load of lime, filling the chest, about 14 barrels of 120 gallons each: load of lime, well piled, about 18 barrels or 540 gallons. Ripples are added for harvest-work, &c.

The poles to which oxen are yoked, are in some instances of extraordinary dimensions. We measured one, attached to a cart, near Cowbridge: it seemed to be an entire tree, selected with some care, with its forked end pinned to the axle: it was  $12\frac{1}{2}$  feet long, 24 inches circumference in the middle, making  $3\frac{1}{2}$  cubic feet. If such a pole be allowed to act as a lever, its great length tends to lighten the weight upon the necks of the oxen, in a greater degree than a shaft of a shorter date upon the back of a horse.

Irish cars (*ceir gwyddelig*) are common in Brecknockshire, and a few other parts. They are convenient to carry grain to the market or the mill, or small loads of any kind. In peculiar situations they are recommendable for harvest-work, on account of the expedition, and tightness of roping. The fore-part of the car consists of a light cratch, opening and closing by means of pivots turning in the shaft or frame of the car on each side, to the top of which is fastened a rope, tightened expeditiously, the length of the load, by means of pegs in a revolving cylinder, fixed in the hinder cratch: the rope, in tightening the load, folds  
around

around the cylinder, similar to that of a common cheese press. We have seen it used as a *sociable*, covered with a tarpaulin, and chairs placed inside, by a farmer, conveying his family to church, in rainy weather.

The old carts have the sides of the base frame of one piece with the shaft. Of late, the shafts are detachable parts, like those of tumbrils or dung-carts: the body of the cart being fastened to the shaft by means of hasps and staples, which are let loose, to tumble out at once loads of stone, lime, or coal. They are preferable also, on account of timber of short lengths being cheaper to make them; and one part being out of repair, does not render the other useless.

#### SECT. IV.—FORMATION OF WHEELS.

Not being convinced by the masterly reasoning of theoretic mechanics, who have exposed the impropriety of using wheels whose rims form sections of cones, the rural wheelwrights are, to a man, in opposition to the dogmas of the pupils of Euclid. One wheelwright in particular, in whom we had found a more than common share of natural intellect, caught fire at the idea, that his favourite conical wheel was to be proscribed by law, and that all wheels made after a certain period, were to be without any dish, that is, sections of perfect cylinders: "*What*," said he, "*and has such an act passed?*" On being answered in the affirmative, "Then I am sure," he replied, "there was not one wheelwright among the Members of the House of Commons at that time." He argued, that

“the spokes of cylindrical wheels, in a length of time, under great pressure, would be more apt to churn in the stocks, than those of conical wheels, which continue firm as long as they retain their original dish or cast, but are weakened by their approximation to the cylindric form, to which they have a tendency.” Here, we observed, that he had made a concession which militated against his own hypothesis. He farther conceded, that “in fixing a bended axle in a conical pair of wheels, it must be so fixed, that the wheels would be two inches and a half wider asunder behind than before, more or less according to the dish; two inches and a half being the adopted equivalent to a pair of wheels five feet high, and one foot wider at top than bottom; and this narrowing the width before, was to counteract the tendency of the wheels to abrade against the outer sides of ruts, &c. in their revolution.” He nevertheless continued to maintain the superiority of his conical wheels, and said, “they would be found more steady under a given weight; the cylindrical would be more apt to be overturned in particular situations—*situations* (he exclaimed with some Welsh warmth) very different from a level table, or a smoothly inclined plane, where the plans and models of the theorists are usually exhibited. Cylindrical wheels are to be considered as perpendicular props on each side of a load: conical wheels have their lower spokes inclining but very little from the perpendicular, but that little is the natural and most effectual position of a prop. You, and your Mr. Cumming, and your House of Commons, may laugh at me, but you cannot browbeat me easily out of my opinion, that cylindrical wheels will not do in all situations. They will not so readily give way to obstacles;



stacles, they must climb up every stone, &c.; and, in our roads here, they would soon be shaken again into spokes and fellics. You compare the drawing of a dished pair of wheels, boxing freely about every obstacle, to the dragging of a conical garden roller! How droll some fellows argue! The comparison is absurd, when all properties and circumstances in both cases are considered. I again affirm, that our wheels with a dish, call them by what hard name you please, made mathematically true to the shape of the axis on which they revolve, turn as freely *upon the ground*, where all obstacles and all friction are to be met with, and only there, as any cylindrical wheels whatever. The lowerspoke on which the weight rests, is nearly perpendicular to the base on which the wheel revolves; the bias or inclination from the perpendicular, is in that part of the wheel which revolves *in the air*, and our Welsh air is so pure, that it gives but very faint resistance indeed."

We admired the ingenuity of the wheelwright's reasoning, though we were not convinced by his arguments. He proceeded—"These gentlemen of the town declaim against the use of six or eight inch wheels having *rounded* surfaces, with three parallel iron bindings; and say, that these 'having not an equal bearing on all their rims, but bear on a narrow part of the middle, and contrived to evade the wise regulations of the legislature with respect to broad wheels, are still more destructive than *flat* conical wheels; as they plough up the roads.' Now let these gentlemen, so fond of experiments, try the matter of fact; not with models made of quarter-inch boards upon a mahogany table, but with loaded carriages upon two kinds of wheels, one with flat, the other with

rounded surfaces, upon any kind of soil, hardened clay or sward, and see which would cut the surface most. The round surfaced wheels would press hard, and by repeatedly going over the same ground, would cut the surface; but the flat surfaced wheels, by the operation of their edges, would cut the surface at the very onset."—*D. H.*

HAVING gone over the chief implements, ploughs, harrows, and carts, we come next to a long list of new implements and coined names—drilling-machines, couch-rakes, cultivators, extirpators, tormentors, rollers, &c. which, in several varieties have been introduced, here and there, by gentlemen improvers and some spirited tenants. The description of the most worthy of notice, together with that of thrashing and winnowing-machines, is reserved for Chap. VII. on *Arable Land*, tillage, crops, and management, &c.

*Weeding Implements* in corn-fields, are reaping-hooks; bended hooks about two inches, with wooden forks; wooden pincers to draw up the root and all, &c.; and in grass lands, docks are by some eradicated with the well-known pronged-lever made for the purpose.

*Chaff-cutters* of various kinds and prices are used. There is one at the Pendaron iron-works, worked by a large water-wheel, supplying with provender seventy horses working in the mines of coal and iron. Mr. Morgan, a surgeon of eminence, near Newcastle Emlyn, on the Teivy, is of a mechanical turn; and by the means of an overshot wheel on a small stream, has constructed machinery for the various purposes of grinding

grinding corn, malt, bruising oats, cutting straw, pounding furze, and thrashing-corn. His reason for becoming a farmer was, that the country was too healthy for Doctors to gain a livelihood by their profession. One of his patients had lately attained her hundred and third year: he had several upwards of a hundred years old.

Too great a complication of supposed conveniences, may superinduce other inconveniences, much greater than those arising from more simple plans. Fastidiously refined and complicated improvements, very often defeat the ends proposed by them, and become incumbrances instead of conveniences.

Glamorganshire may truly be considered as the *Arcadia* of Wales. Not only its music, poetry, customs, and manners, bear marks of the peculiar simplicity of the pastoral age, but some of its implements of husbandry, also seem to have been continued from a very ancient period. And this appears to be the more extraordinary, as it is one of the earliest parts of Wales that underwent the Norman yoke, and can be accounted for only by the policy adopted by Fitzhamon and his deputy pillager, being different from that pursued by the invaders of Pembrokeshire, where the Welsh language, national manners and character, have been entirely annihilated. The valleys of the Cynon, the Taaff, and the Romney, &c. resound in spring and autumn with the ploughboys' songs, chearing their oxen to labour. Mr. Marshall, in his *Rural Economy* of the West of England, notices that the ploughboy there drives his oxen with a kind of tune, resembling the cathedral chaunt. These kindred tunes on each side the Bristol Channel, and the *Rans des Vaches* of the Swiss, seem to be relics of the true pastoral age. The Glamorgan ploughboys' song consists of detached



stanzas of four lines of seven syllables each; some moral, some amatory, and others containing meteorological observations on the weather, and other rural subjects. To every stanza is attached a kind of antiphony, or chaunting chorus, seemingly addressed to the oxen, in their own dialect. These truly simple and original pastorals are not confined to the ploughboys; for the dairy-maids also sing varieties of stanzas, with a chorus at the conclusion of each, invoking the cow to stand quietly, and give her milk readily whilst she is chewing her cud. The miller's boy also, whilst he is carrying his customers' grist to the mill, strains his organs in chaunting the praise of his master's honesty, &c.; and at the conclusion of each stanza, gives notice of his approach by the blast of his horn.

The more peculiar implements of Glamorganshire, are the *rakes* and *shovels*. Mr. E. W. has not noticed this kind of rake in any part, save in this county and Monmouthshire. The tine are double the length of those of common rakes, being driven through the head, so as to be of equal length on each side. The head makes a bevel angle with the handle, and not a right angle, as the common rakes of other countries. At work, the acute angle formed by the head and handle, is always next the person using it; and the advantage of it is, that he need not step his foot backward at every reach. At the end of the row, when he turns back and changes his hand, he must also turn the side of the rake, so as to have the obtuse angle always farthest from him. Common rakes have their tine inclining inward, so as to run smoothly along the surface of the ground; but these bevel-headed rakes have their tine at right angle with the square of the head, and perhaps consequently more objectionable; notwithstanding either their superiority, or the singu-

regularity of their make, causes them to be sent for into some parts of England. The tine may be fixed so as to incline inward on both sides.

Large stubble-rakes, some with wooden, and some with bent iron tine, are in use on oat, barley, and even on wheat stubbles and hay ground. The wooden rakes cost from 3s. to 5s.; the iron-tined rakes about 10s. 6d. They are commonly called *hell-rakes*. The etymology of the term is disputed; some saying they are called *hell-rakes*, because they *devilishly* rob the poor of their customary perquisite of leasing or glean-ing; others deriving the term from the Welsh *hela*, to gather or collect together. Slovenly reaping first occasioned these rakes on wheat stubbles. The poor are injured by them; and the rakings when collected in heaps, dirt, stubble, and all, are of inconsiderable value. On oat and barley stubbles they do well, and also on brushes of clover, rye-grass, &c.

The *pala* of the Romans is still preserved in the Welsh *pâl*, from which is the verb *palu*, to dig. It consists of a cleft of tough wood, formed into a handle, and a square head edged with steeled iron. It is now driven into the mountains by the more useful iron plate-spade. The Glamorgan shovel is a handy tool for carting compost manures, gravel, loose soil, &c. It is a roundish iron-steeled plate, with a sharp point, resembling the spade ace upon cards\*, with a long curved handle, by which the men are much eased at work, having scarcely any occasion to bend their backs at all. Shovels on this principle are on sale in

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\* On old cards, the form of the suit called *spade*, is that of a *shovel*: on modern cards, the makers have adopted a happy improvement, even in that article, by substituting the true *spade* ace for the old *shovel* ace.

England as well as North Wales; but their handles are much shorter than those of Glamorgan. When three or four men are at busy work in filling the same cart, the long shovel seems to have the advantage, as the men are not so liable to interrupt each other, being able to throw the soil, &c. with greater ease, to a greater height and greater distance.

## CHAP. VI.

## ENCLOSING—FENCES—GATES.

## SECT. I.—ENCLOSING.

IN several parts of the district, enclosures are of very ancient date, even co-eval with the first glimpse of the dawn of Agriculture. The country being then an entire forest, the area selected for tillage was riddled, leaving a surrounding line, frequently of no determinate shape, for fence and boundary. In tracts more open, the vacant spaces between clumps of bushes were filled up with dead fences of stakes and trowse, or wattle. And as the transplanting of strong quicks or staggarths was not then a common practice, a straight-line fence was no object, when a growing quick was in view a few yards to the right or left. This method of enclosing, performed at various times, by different persons, accounts for the great irregularity of shape which old enclosures frequently exhibit.

This enclosed tract includes the counties of Brecon, Caermarthen, Glamorgan\*, and Radnor, with the more eastern parts of the counties of Cardigan and Pembroke.

\* Glamorganshire seems to have been enclosed from remote times: D. ab Gwilym says of it, about the year 1380, thus—

“Gwlad dan gaead yn gywair,  
Lle nod gwydch llawn yd a gwair.”

i.e. A country enclosed in good order; a place of great note, abounding in corn and hay.

The

The common wastes, hitherto unenclosed by acts of parliament or otherwise, of course remain open.

Much of the western coasts of the counties of Cardigan and Pembroke is still open. The present nakedness of this maritime tract is not easily accounted for, as it is asserted by authority, not easily refuted, that St. Bride's Bay, and other parts, in the vicinity of this naked tract, were once forests of wood\*. Now, the table-land along the whole western coast, excepting a few sheltered dingles, and recent plantations and enclosures, is entirely destitute of woods and hedges, so much so, that a companion of ours jeeringly observed on the spot—"Here, crimes must pass unpunished, because wood for gallows cannot be procured, nor even a switch to beat a dog."

However, in these parts, enclosures are slowly progressive, which will appear by the following contrast of statements at different periods. Mr. George Owen, who wrote in the latter part of the reign of Elizabeth, says—

"This part (Pembrokeshire) is naked of wood and shelter, bare champion ground, with few hedges or inclosures to be found; by reason whereof the husbandmen are forced to keep herds for their cattle, and that in greater numbers than other counties in England do, or that they themselves need; for I have by good accompt nombred three thousand young people to be brought up continually in herding of cattle within this shire, who are put to this idle education when they first come to be ten or twelve years of age, where they

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\* Girald. Itin.—Drayton in Polyolbion.—G. O.'s Hist. of Pembr. in Cambr. Register.—Malkin's Tour, &c.

**and** are the purgatorie of alternate heat and cold, until **they** attain twenty or twenty-four years of age, when **they** are succeeded by others in their turns."

**In** another place this writer adds—"One of the **eight** wants, and not the least inconvenience of Pembrokeshire, is the want of *inclosures*, whereby a multitude of towardly young wittes are spoyled, by **im**ploying them to be herdes; spoyling, in that idle trade, **both** outwardly theire shape of body, and inwardly the **giftes** of the mynde."

The annotation of John Lewis, Esq. about the year 1700, upon the foregoing account, is as follows:—"Pembrokeshire now, though there be too much champagne, still is so much altered by *inclosures*, that it is not liable to the same censure as it might have merited in Queen Elizabeth's days."

From this latter date, enclosures became more and more common. Between the years 1750 and 1760, whole parishes were enclosed by common consent.

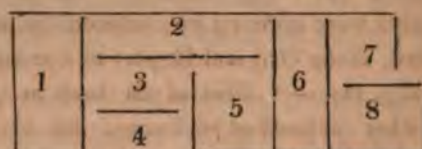
Mr. Lloyd, in the Original Report of Cardiganshire, (1794, p. 13), says—"Most of the land in Cardigan Lower, is either enclosed or enclosing. Since the peace of 1763, considerable enclosures have been made." Cardigan Upper is much more open; it is nevertheless rapidly improving. Travellers who from thirty to forty years ago, remembered the road from Tal y Bont on the Machynlleth road to Aberystwyth entirely open, without scarcely an intervening shrub, excepting the woods and hedges on Gogerddan demesne, now find a pleasing alteration, in having the road lined on both sides, the whole length of the route, by flourishing hedges. What these hedges and fences consist of, in this as well as other parts of the district, will appear in the next Section.

*Advan-*



*Advantages of Enclosing.*—"No difference of opinion arises as to the utility of dividing and enclosing open and common field land in general; and it is evident that population is considerably increased thereby. The value of the land increases by being enclosed, in proportion to the subsequent treatment it receives; but upon an average, it is thought to be more than double its original value. The fences alone benefit the land, by giving shelter to it. The husbandman manures with a certainty of reaping the fruit of his labour, and the produce and stock are consequently improved in at least a twofold degree."—*Mr. Hussall, in Caermarthen*, p. 21; *Pembroke*, p. 20.

The necessity of allotting and enclosing open fields, will appear very evident from the annexed sketch of a number of quilleys of open land lately taken in a tract of excellent barley soil on the sea-coast of Cardiganshire.



Some quilleys are not above 60 yards long by about 30 broad. Such minute division and mixture of property, are evidently the effect of the deservedly abolished gavelkind tenure. The inconvenience in tillage, laying down in clover, &c. is made more manifest by supposing, a thing not at all improbable, that quilleys numbered 1, 5, and 7, belong to A; numbers 2, 4, and 6, to B; numbers 3 and 8, to C, &c. Fortunately for the occupiers, this tract is part of the lordship of *Llanddewi Brevi*, for the dividing and enclosing

enclosing of which, an Act is to be passed in the present (1812) Session of Parliament.

Several instances might be adduced of similar admixtures of property in open fields. In the best enclosed parts of the country, in numbers of parishes, there still exists one piece called *Maes y llan*, so called from its vicinity to the parish church, which consists of a very inconvenient number of quilllets of all sizes, and belonging to several persons. Wherever acts of enclosure take place, these come under the cognizance of the Commissioner.

In the northern and north-western parts of the district, as long as they remained open, labourers were obliged to migrate to the southern and eastern parts in search of employment, of which they now find enough at home, since enclosures have taken place.

Security against depredations of animals, is a great encouragement to tillage. We of course see now very large quantities of corn raised, where only, some years ago, a few sheep and cattle of inferior and stunted breeds straggled in a half-starved condition; for hay, or any other winter fodder, could not be raised, or otherwise procured, in any considerable quantities. But now, in addition to the more than treble quantity of corn, the number and value of stock has increased to more than double what they were before. The poor are now employed, who were before maintained by parishes equally poor: farmers that heretofore hardly procured a scanty subsistence, now begin to find themselves in the way of making decent fortunes; and those who have to purchase, find plenty to be had for their money at the very next doors, excepting in years when scarcity of corn becomes general.

## SECT. II.—FENCES,

ARE of three kinds: 1. Quick hedges; 2. Stone walls; and 3. Naked soil fences, or stonies and sods in alternate layers, called *cloddiau moellon*, or bald fences.

1. *Quick hedges* consist of the following varieties of wood, underwood, shrubs, &c.

1. Hawthorn (*crataegus oxyacantha*) of three or four varieties. It is natural to all good soils, especially that upon limestone: old fences in the Vale of Glamorgan are mostly composed of it: it is raised in vast quantities in nurseries for new fences in most parts of the district. Notwithstanding its large growth on good soils, where it is considered as a fine grained wood for cabinet work, and springs up like weeds in abundance on old pastures; it is nevertheless ranked by farmers among the hardier quicksets, to be planted in cold upland situations, where the common hazel would starve. Whether difference in size of tree and leaf, and in colour of flowers, constitute an essential, or only an accidental variety, we do not know: there is however one dwarfish kind; fuller of spines than others, and is of course better for fences.

2. Black-thorn (*prunus spinosa*) in several varieties; makes one of the most impenetrable of fences; inferior to hawthorn only in propagating its species by numerous suckers in pasture-lands adjoining. But this only inconvenience it occasions, makes amends by its fence being always thick at bottom; so that if the sod bank of two or three feet high be regularly trimmed, the sods will soon be covered with black-thorn; so as for ever after to render unnecessary the unsightly appearance,

ance, and the frequently recurring trouble of renewing the sod fence. It is more precarious in transplantation than the hawthorn, owing to the fewness of its rooty fibres. The horizontal spur or heel root, is easily crushed by being grubbed up, which tends much to its decay. It, however, well managed, endures transplanting late in the season, even when in blossom, better than most of the hedge tribe. David Thomas, the Welsh topographer, about 1720, commends the Pembrokeshire farmers for their black-thorn fences\*.

3. Crab-tree, or wild apple (*pyrus malus*) of two varieties. The first seems to be derived from the seeds of cultivated apples, casually sown by birds and apple-eaters in hedges, &c. This grows to a very large tree, which is frequently sawn into planks and boards for various purposes. Its fruit is of several varieties, intermediate between the sourest crab, and the least palatable cultivated apple; and by proper management, makes excellent cyder, being highly vinous, and a strong-bodied liquor when arrived at a mature age. The second is the true and indigeous wild crab. Its growth is less, and its fruit much smaller and more acid, than those of the former variety. It is also much more spinous, and consequently a much better component of fences. When raised for the purpose in a nursery, care should be taken to collect the seed from the true wild crab tree, and not from mongrel half-apple trees without spines. The tap-roots of this species, as well as those of hawthorn, cut off when they are transplanted from the nursery-bed, preserved

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\* "*Meurddd mawrion, rychion, llydain,  
Planwydd union o'r coed du-ddrain.*"

i. e. Fields dry and extensive, with luxuriant sets of the black-thorn.



and dibbled into beds, will immediately grow vigorously. The writer of this article, in transplanting the seedlings of the wild crab, and finding their tap-roots inconvenient to be replanted, cut them off at the length of from four to five inches. The roots lay neglected on the surface of the ground for about a fortnight, during a dry spring. They were then put to soak in a mixture of mud and water, and soon after dibbled just over their head into beds of fine mould. He was pleased to find the roots thus dibbled, overtaking the parent stems in growth the first year. They now compose an excellent fence, being plashed in the fifth year from their being verjuice core. This method of preserving the roots, doubles the number of quicksets. In this instance, the long tap-root only was cut: Mr. Carpenter recommends cutting and dibbling the side-roots as well, by which means the number might be quintupled. These trees, of the genus *pyrus*, are the only ones on which *misseltoe* has been noticed to grow\*.

4. Hazel-nut tree (*corylus avellana*) is a prolific self propagator. Upon an average of the district, it composes a fence of more miles than any other one species. On the slate and coal tracts, it is the most common in fences; on the limestone, much less common; but there, on depth of soil, it grows to a larger size, so as to be converted to various uses, rails, poles for sliding cars, bark hoops for coopers, handles for rakes, shovels, mattocks, &c.

Though hazel be the most common fence, it is nevertheless never made new excepting from grown staggarbs,

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\* The Druidic misseltoe, growing upon oak trees, seems to be a fable.

grubbed up in woods, useless or crooked fences, &c., as by its texture it too easily yields a passage through for mischievous animals, whether brutes or nut-gatherers. E. W. says there are varieties of it: the large cob-nut, filberd, &c. being frequently found in woods upon the coal tract.

5. Elder (*sambucus*), plentifully in the lowlands on gravelly and loamy soils; seldom in the uplands, save near villages and houses. The common people say it indicates a good air, and was planted formerly around gardens and orchards to preserve them from blights. There is a scarce variety with white berries; the black making the strongest, and the white the most palatable wine. Elder syrup was formerly in much request in West Wales, to be used in brewing strong ale, and thereby forming a beverage called *ebulo*, probably a Roman relic from *ebulus*, the dwarf-elder.

“Elder, lombardy poplar, abele, &c. as they grow rapidly from cuttings, have been recommended as the most proper for speedy fences. Where seedling hawthorn, &c. have been planted for hedges, these will do well, the weather side, to shelter the others. The abele may be plashed and matted, so as to make an useful fence.

“Cuttings of elder planted, will in three years form a good hedge. Elder is of all other wood the most rapid in its growth. To make it grow thick, it should be rough-clipped every year, especially the first three or four years. It will bear the sea air, and will thrive in any tolerably dry soil, and the soil of mounds is sufficiently dry every where.”—E. W.

“Hedges of elder, at Solva, in Pembrokeshire, in the teeth of the sea, and the south-western winds,



very flourishing, such as I never saw."—*Richard Fenton, Esq.*

6. Privet (*ligustrum vulgare*) occasionally on most of the tracts, but more frequently on the white limestone, where an evergreen variety is now and then seen. It is a beautiful flowering shrub, and makes excellent garden fences, arbours, &c.

7. Dog-berry tree (*cornus sanguinea*), forms a considerable part of the fences in lowland situations, and is ornamental both in flower and in fruit.

8. Single-flowered Guelder rose (*viburnum opulus*), seems to occupy the middle regions, in preference to either lowland or highland. It is more beautiful than useful in a fence. It is frequently seen in the lowlands in company with the dog-berry tree, No. 7, who is seldom so civil as to return the visit, by appearing in the middle region.

9. Spindle-tree (*euonymus europæus*), in the lowland and middle region frequent; more beautiful in flower and fruit, than useful as a fence. This is called in Welsh, "Y pren y crogodl D—l ei fam," i. e. the tree whereon the D—l hanged his mother.

10. Way-faring, or pliant mealy tree (*viburnum lantana*), plentiful in hedges, &c. on limestone. Its pliant twigs are very useful for strong basket-work.

11. Barberry-bush (*berberis vulgaris*), occasionally in hedges and woods. The rumour of its blighting wheat, may hinder its cultivation for fences, although it stands in about the fourth place for excellence. The bark is a common specific in the jaundice. The fruit is used for pickles. One variety is said to be barren.

12. Holly (*ilex aquifolium*), every where more or less, but more frequently in the mountains of the slate and coal tracts. It grows to a large size. Its

**wood** is valuable. It makes excellent clipped fences. Raising plants from seeds is a tedious process. When the plants are two or three feet high, it has been recommended to strip off the leaves and branches, and then to *lay* them under a competent quantity of soil, in the direction of the proposed fence. By this means they will send forth numerous suckers, which will quickly advance to a fence impenetrable even to a wren. Some hunt the woods for holly bushes, such as have horizontal branches of a few years growth sweeping the ground : these they *lay* with forked pins, and cover the part with soil. When the laid joints have struck root, they are cut off and planted. Such horizontal branches as touch the ground, naturally strike root, and when cut off carefully, have been planted with success.

An old shoemaker was observed to have his cottage surrounded with luxuriant hedges of holly. He kept his method of raising them a secret, which died with him. One of his neighbours, however, silently observed his practice, and said, that he usually collected fine young cuttings of two years growth in the woods, and planted them in a moist loamy foss or ditch until they rooted, and that from thence, he transplanted them to their final settlement. Boucher, on forest trees, says, "I have raised the different kinds of hollies from layers, and even from *cuttings* ; but I recommend neither : they are not only extremely tedious methods, but I was never able to make good plants from them."

The same author adds, "The holly is got into disrepute, from the supposed difficulty of rearing and transplanting it. In ordinary ways, that may be the case, when sown thick, transplanted young, and dibbled, &c. but by my management, the winds make

no impression on them ; nor is there in nature a hardier tree, one that roots better, is more patient of cutting both in root and body, and may be planted with undoubted success, from one to twelve or fifteen feet high."

Boutcher's directions for raising hollies, may be abridged thus: "April, 1812, sow seeds collected as late in the season as possible, in order that they may arrive at full maturity, even as late, in northern climates, as February or March. The four seeds in each berry should be separated, for the sake of a regular sowing, and may be done by throwing the berries into a tub of water, and rubbing off the pulp with the hands. Dry the seed thus separated, and sow them in beds, covering them with about three-fourths of an inch of mould. In autumn, rake the surface, and replenish with fresh mould. Repeat this raking and replenishing in April 1813, or sooner, before the appearance of the germs. In April 1814, thin the plants, setting the drawn plants in lines, eighteen inches apart, and six inches between the plants, in order to promote their growth by digging. These are to remain well weeded, &c. until April 1817; when, in a tolerable soil, they will be fit for hedges. The plants remaining in the seed-bed, should be transplanted into drills in April 1815, the roots carefully trimmed, to continue there until April 1817, as before. In poor soils, a longer lease should be granted for the plants in the nursery, that they may collect more vigour by age and culture. In April 1817, transplant a second time into wider drills, about three feet by eighteen inches. In April 1819, dig a trench a foot deep on one side each row, and with a sharp spade cut the tap-roots, at about ten inches deep. Replace the

the mould, and dig well about them. In February 1820, cut them close to the ground; and in April 1821, they may be removed for good, without the loss of one in a thousand. In removing them, be careful to let bulks of mould remain at their roots. Prune only the bruised roots, the tap-root being before checked by the spade-cutting. Plant them immediately, the same depth they formerly stood. Give them a plentiful watering, and repeat it once in ten or twelve days, if the weather be dry. The plants having been cut the preceding year, will have made numerous shoots from twelve to eighteen inches. Thus you will have a hedge formed, without any more trouble than keeping the roots clean for a few years, and annually clipping them, which in a short time will defeat the attempts of the strongest bull to injure it.

“ You may plant holly every third or fourth plant, with thorns. The thorns for four or five years will carry the lead; after which the hollies will annually gain ground, and at last totally extirpate the others. Thus, by planting a third or fourth of holly with thorns, you will soonest have the appearance of a fence, and afterwards, by an agreeable metamorphosis, have an entire holly hedge.

“ Hollies should never be clipped later in the year than July.”

On Peterwell demesne, on the banks of the Teivy, we observed a holly-hedge that had been extended nearly its whole length by many successions of layers; the shoots, as they grew to a proper size, being regularly layed in the direction of the fence, until the whole was completed.

13. Bullace-tree (*prunus insititia*), most common on the rag-lia limestone of the Vale of Glamorgan,

but found frequently on other soils. They form a good hedge. There are several varieties, as black, red, white, &c.; their fruit generally ripening in October and November, when their taste is by some called a "pleasant subacid." A large kind of black bullace, or wild plum, called *Cwm-kiddy crake*, is found indigenous in the woods and hedges of Cwm-kiddy Vale, in the parishes of Barry and Porth-kerry, on the flag-lias limestone. The fruit ripens in November, and will continue on the trees, in perfection, till Candlemas. It is a pleasant fruit, and the more so, as it comes in a season when no other fruit remains unpreserved.

14. Red crake (*empetrum rubrum*), on the grey-lias limestone, in hedges in the parishes of Ilanecavan, Flimston, Eglwys, Brewis, Lantwit-major, &c. The fruit is larger than that of wild plums in general, and might more properly be called a wild apricot. Its leaves are heart-shaped, has no spines, is a poor bearer, otherwise it would be worth cultivation in fruit-gardens. It grows thick as a hedge shrub.

15. Buck-thorn (*rhamnus catharticus*), in several places, but most commonly found on the blue and grey-lias limestones. It grows to a large size when cultivated in orchards, &c. Its fruit is well known as a medicine.

16. Service, or sorb-apple (*sorbus domestica*), on the sea-cliffs of the lias tract, at Roose, Barry, Cadoxton, &c., and in a few instances more inland. Fruit, yellowish brown, like a small pear.

17. Wild service-tree (*crataegus torminalis*), on limestone, in Glamorganshire and Pembrokeshire: one twenty feet high, twelve feet length in the butt, and a foot square, at Stackpole Court.

18. Moun.

18. Mountain ash (*sorbus aucuparia*), in woods and hedges of the slate and coal tracts; it affects high situations, and is seldom found indigenous on lowland limestone. An useful medicinal beverage is made of its fruit, which has been used with good effect, as a cheap substitute for mountain wine, in forming a chalybeate with steel-filings, which is considered as a powerful tonic. The infusion of its bark is used as an anodyne, and is given by our sapient old women, the most harmless of all quacks, in intermittents. This tree, with elder and vervain, were a triad possessing superior virtue, in the estimation of our soothing forefathers; and even to this day, when a Katterfelto comes to a village, the simple rustic prepares a spectacle formed of the twigs of mountain ash, through which he may see the secrets of the black art.

19. Bastard, or dwarf service-tree (*sorbus hybrida*), on the sea cliffs, at Fontugary, &c. in Glamorganshire, and, according to Mr. Waring, on the ruins of Castell Dinas Bran in North Wales.

20. Bird-cherry (*prunus padus*), in upland woods and hedges. In mountain valleys, several roods of hedges of this shrub are found without any intermixture. Plashed and trimmed, it forms a tough strong fence. It is a prolific self-propagator. As a standard, in sheltered woods, it grows to a larger size.

21. White-beam tree (*cratægus aria*), in Gower, Pont nedd Vechan, and a few other parts in Glamorganshire—scarce.

22. Butcher's broom (*ruscus aculeatus*), in several places on the upland coal and slate tracts; cultivated in the gardens of the vales, as an ornamental shrub.

23. Broom (*spartium scoparium*), on dry upland soils



soils most frequent, where it commonly forms an inefficient part of fences. Its greatest use is for cottage besoms, and thatching. Some brewers use it as a bitter, and old women prescribe its infusion in cases of dropsy. It is vulgarly supposed to indicate fertility. *Mae aur tan y banadl*, says the Welsh proverb; i. e. there is gold under the broom. In its favourite situations, it grows to a large size, so as to girt a foot or thirteen inches.

24. *Ulex europæus*, the *furze* of the south of England, the *whin* of the eastern, and the *gorse* of the northern counties. The Welsh, in their general vocabulary, have adopted the latter term. In their own language, they distinguish two varieties: 1. *Eithin ffreinig*, French gorse, or *eithin y vro*, vale gorse; the great, upright *ulex*, flowering with the broom in May and June; and 2. *Eithin y mynydd*, mountain gorse, the lesser, procumbent *ulex*, flowering with the heath (*erica*) in autumn.

The *first*, in favourite situations, grows to a great size. George Owen, in his MS. History of Pembrokeshire, written about the close of the sixteenth century, and lately published in the *Cambrian Register*, says, "It is very usual to have the stalks of a foot-compass, and eight or nine feet high; and of late for a tryal of wagger, there was a gorse stalk measured 33 inches in compass." Mr. Lewis, in his *Annotations*, written about 1700, says, "The gorse of this country (Pembrokeshire) formerly left unmolested, was knowne to grow to an uncommonly large size; and I have rode a hunting, mounted not on a very low horse, through avenues of gorse much higher than my head, near Newgall, and elsewhere; nor do I hear that

that they attain that size in any other county of Wales, which inclines me to think there be something peculiar in the soil, to forward the growth of that shrub."

The spots most genial to the growth of large gorse, being thought to possess superior fertility, in process of time, and in accessible places, were subjected to the operation of the plough and the harrow. Nevertheless, in late times, a mason in the Vale of Glamorgan, told us, he had used gorse stalks as mallets for dressing freestone.

The tender shoots of this ulex, have been used as fodder for horses and horned cattle in several parts of Wales, time out of mind. George Owen, in the History of Pembrokeshire before referred to, says, "These furze keep greene all the winter, and the toppes of them are good for the cattell; which being generally allowed of, makes me not a little to marvell, that the witt of man hath not devised some machine to breake them, so that they may be served to the cattell with greater safety, when the weapons they are armed withal are bated." The witt of man hath since the reign of Elizabeth, supplied the want above complained of. In South as well as North Wales, the most simple method of pounding furze in wooden or stone troughs, is by manual labour, with beetles. Some larger beetles or mallets are worked by water, like fulling-mills; stones, revolving in a vertical position, like a tanner's common bark-mill, are also used, with a chaff-cutter attached, and worked by the same water-wheel.

Some writers, as well farmers, ridicule the practice of keeping any spot of land covered with furze for the sake of foddering stock. We refer such persons to Dr. Anderson's statement, and to two letters signed O,  
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in the *Agricultural Magazine*, Vol. VII. pages 115; 200, where the writer sensibly observes, "It should moreover be remembered, that furze is capable of cultivation in situations where the prudent farmer would neither risk his labour or seed; and that its returns as a crop, are from eight to fifteen tons per acre, which will go as far as the same quantity of hay; a produce sufficiently large to induce the farmer (particularly the dairy farmer) to cultivate it, being always a certain green crop from October to March. Horses thrive particularly well upon it, and are exceedingly lively and hearty in their work; but I have usually given it to them mixed with chaff, containing one part of hay and two of straw, yelmed together, and cut by a-chaff-cutter. To milch-cows it is given in the same manner; and the milk they give whilst thus fed, and the cream and butter produced from it, are remarkably sweet and well tasted, not inferior, in my opinion, to that produced whilst feeding on grass, either in quantity or quality.

"It is not advisable to feed stock with furze in blossom, as they are then over-heating. The farmer should so contrive it, as to have a constant and regular succession of proper crops of furze, by cutting over the stalks at different periods, so as to have one crop ready to cut, whilst the other is growing. I again repeat, that the returns of furze are so large, and produced at that particular period, when green succulent herbage cannot be obtained (but for which it is a most excellent substitute), that I should hope this statement may be the means of inducing some farmer, like myself, to avail himself of the kindness of Providence, which has given us a plant natural to the land we live in, capable of growing on the most unproductive soils, and

and in the bleakest situations." In addition to this account, see Fox's Original Report of Glamorgan, p. 59.

The second use made of this ulex, is for *fences*, especially in the maritime western exposures of the counties of Cardigan and Pembroke; the account of which is reserved for the Section on *Sod-fences*. The third use is for fuel; fourth, for wattling temporary hovels in fields, &c. for young stock to run in and out of, at pleasure; fifth, for casing corn stacks.

The chief use of the lesser ulex is for fuel.

Botanists are divided, whether there be more than one species of ulex. Some of the most eminent, with Linnaeus at their head, are either silent, or hesitate on the subject. Others, more numerous, observe some faint distinctions of botanical character; and insinuate, that should these varieties of character prove permanent, it will be readily allowed that they are distinct species. Without laying any pretensions to the nice distinctions of botanists, we may state a few remarks upon the two kinds, whether they are distinct species or not.

1. The *larger* ulex occupies the drier soils, and thrives best in the mildest air. The *dwarf* kind is sometimes found in such situations, occasionally spreading over large plots, and smothering every other vegetable; and in other places permitting the fern (*pteris aquilina*) as a joint occupant; but it is more commonly the produce of poor clayey soils, where it pitches its camp among the more beggarly tribes of rushes, cotton-grass, and needle furze, or petty whin (the *genista anglica*), &c.

George Owen, before quoted, has noticed this distinction of soil: "The land that beareth this kind (the *larger* furze) is accompted good corne land. The only meane to procure this shrubbe to springe up,

up, being once decayed, is to plowe the land, and till it for three or foure yeeres, then let it lie, and presently the furze will springe againe, as the fenix is sayd to do out of the ashes of her ancestor. The *small* or *tame furze*, of some called *Welsh furze*, is a shrubbe growing on bad ground, barren and shallow."

2. "This last kinde," (G. O. continues\*), "blossometh with the heathe in the latter end of harvest, against winter; whereas the former accompanyeth the broome, and bloweth in May, against the summer."

From the above data, it might not inaptly be inferred, that the variety in growth and season of flowering, ariseth from a variety of soil and climature, rather than from a distinct principle of vegetation; were we not to observe both kinds of furze growing on the same spot, especially in the middle regions, and each flowering, with some variations of earliness and lateness, in its own peculiar season. Miller does not throw much light upon the subject, by saying that he sowed furze-seeds in the garden, and found all the varieties rising from the same seeds, except, he had informed us, that he himself had collected the seed from the same identical shrubs, at the same time. We may observe furze, of some variety or other, flowering in every month from early in March till late in October. When one shrub is casting its ripe seed, another is forming its pod, and a third is developing its flowers: all this may have its cause in varieties of soil and climature, or other local and accidental circum-

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\* We quote this writer the more frequently, out of respect to the character and talents of a Pembrokeshire author, in the reign of Elizabeth.

**stones.** Well conducted experiments in sowing and transplanting the different varieties, might set the question at rest; but time is too valuable to be repaid by any such discoveries.

**The** *genista anglica*, needle furze, or petty whin, is by the Welsh ranked among furze, and called *eithin y gath*, or cat-gorse, and *eithin yr ieir*, or pen-gorse. They are of no known use, and are always found on the most ungrateful soils, and in climates of some elevation. They are frequently found accompanying the lesser procumbent furze, but hardly ever with the larger or upright variety.

25. Spurge laurel (*daphne laureola*), evergreen, on the strong loam of the lias limestone tract.

26. Spurge olive (*daphne mezereum*), scarce, but said to be found in a few places, about St. Fagans, Fair-water, &c. in Glamorgan.

27. Raspberry (*rubus idæus*) in the mountain valleys abundantly.

28. Gooseberry (*ribes uva-crispa*), several varieties, obviously indigenous; in woods and hedges in the limestone vales, on dry gravelly soils, &c.

29. Black currants (*ribes nigrum*), on the brink of brooks, &c. on rich soil, between Landough juxta, Cowbridge, and How-mill.

30. Box-tree (*buxus sempervirens*), a common garden fence, but not indigenous in this district. It grows freely from cuttings.

31. Sweet willow, or Dutch myrtle (*myrica gale*), in mountain bogs; Cygyrwen bog, Panwen Byrddin, Cremllyn, &c.

32. Juniper (*juniperus communis*), in Barry Islet, Barry Cliffs, Mumbles, near Swansea, &c.

33. Willow (*salix*), many varieties; but the most common



common in fences is the brown or Welsh willow, apparently the *salix caprea* of Berkenhout. It is slower in striking root from cuttings, than any of the introduced species, namely the crack-willow, hop-willow, &c.: though, like all willows, it affects a moist situation, yet it will thrive in most kinds of soils, where it has no moisture save what comes from the clouds. Though of humbler growth than the more modern introduced willows, it sometimes produces timber of a foot or fourteen inches square. Hedges of it, plashed down, are very liable to be damaged by the browsing of cattle. It bears the sea air better than any other willow. The Rev. Dr. Hunt of Margam, planted it on the marshes, as a screen to preserve the south-western side of a plantation exposed to the Bristol Channel, where it did not seem to be at all checked in its growth.

Mr. Mirehouse has some luxuriant fences of the osier willow, called in Welsh *Mér-helyg*, or the aquatic willow (*salix viminalis*), on an elevated sandy bank, facing the open ocean, in Pembrokeshire.

These two kinds, the Welsh and the osier, and their several varieties, were formerly the only species of willow known in Wales. Since that time, willows of larger and quicker growth, called in Welsh by the general name of *Helyg ffreinig*\*, have been introduced, and are cultivated largely in numerous places well

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\* We have in one instance rendered *ffreinig*, *French*; which not only pays too great a compliment to our neighbours over the channel, but may also be incorrect. Mr. Owen, very properly, renders *ffreinig*, "of a prompt, active, or free nature; of a free or full growth:" whence *Collen ffreinig*, a walnut-tree; *cnau ffreinig*, walnuts; *eithin ffreinig*, the greater furze; *berws ffreinig*, garden cresses; *llygod ffreinig*, Norway or brown rats; *ceiliog ffreinig*, a turkey cock; *helyg ffreinig*, the larger willows, *salix fragilis*, *salix alba*, &c.

adapted to their growth, for shelter and prospect whilst growing; and when felled, are converted into rails, hurdles, gates, &c. &c.

*Parasitical Plants, common in Hedge-Fences, but not able to support themselves as Fences without the assistance of others.*

34. Bramble (*rubus fruticosus*), abundantly every where; creeping and striking root at every joint; troublesome in meadow lands, entangling and fleecing sheep in winter, &c. Some of the more careful farmers cut them close to the hedge once or twice a year, but more especially in autumn, before the mountain sheep have the run of the farm.

35. Common briar (*rosa canina*), in Welsh, *march fieri*, or *mieri ffreinig*, very common. A red and hairy excrescence growing on this briar, was formerly accounted a specific in the chin-cough: but strange! to be an effectual remedy, it was to be found without being sought for.

36. Eglantine, or sweet briar (*rosa rubiginosa*), in woods and hedges of the limestone tract.

37. Burnet-rose (*rosa spinosissima*) of shorter stem, and bearing larger fruit than the common briar; in situations of some elevation.

38. Tailor's-briar, stems slender, numerous, green, and smooth, like rushes; with fewer and lesser spines, whiter and later flowers than the common briar; more frequent in shaded woods than hedges.

39. Great bind-weed (*convolvulus sepium*).

40. Great wild climber, or traveller's joy (*clematis vitalba*), in woods and hedges on limestone abundantly.

It injures the hedges, by killing the hawthorn, &c. The Welsh call it *coluddion y d—l*; i. e. the d—l's guts.

41. Honey-suckle, or wood-bine (*lonicera periclymenum*), plentifully in woods and hedges.

42. Briony (*bryonia alba*), in woods and hedges every where.

43. Ivy (*hedera helix*), in woods and hedges every where: two varieties.

44. Woody-nightshade (*solanum dulcamara*), plentifully in hedges, &c. on the limestone and red sandstone soils.

45. Hops (*humulus lupulus*), occasionally met with in hedges.

In hedges are found also all the varieties of timber trees; some permitted to attain their full growth; others indiscriminately plashed down into the fence: of these we may enumerate the following, in addition to the crab tree, alder, birch, &c. already inserted.

46. Oak (*quercus robur*), in the slate, coal, and sandstone tracts; much less numerous in the limestone tracts. The oak growing on the flag-lias limestone, soil a strong clayey loam, are said to be more difficultly cleaved, more tough, and better adapted for purposes of the ship and cartwright. Coopers, &c. prefer the oak of other tracts. Oak on the coal tract bear the sea air better than those on limestone; a circumstance which will be explained in the Section *Sea-coast Fences*.

47. Ash (*fraxinus excelsior*), more particularly in the slate and coal tracts; less numerous on limestone. The most useful of all trees for rural uses, from four inches girth to the largest size.

48. Beech (*fagus sylvatica*), in the coal and sandstone tracts, and on low gravelly soils.

49. Eng.



49. English elm (*ulmus campestris*), in all the various soils of the Vale of Glamorgan, springing abundantly in the hedges. Its Welsh name, *Llwyfain Rhufain*, bespeaks Roman introduction; Virgil notices its leaves for fodder; and in Wales, infusion made of them is given to weaned calves, with linseed, hay tea, &c.

50. Wych-elm (*ulmus montana*), on most soils; but more frequently in mountain dingles in the coal and slate tracts. The best of all trees for wheel stocks. A pair, three feet in length, from fourteen to eighteen inches diameter, generally sells for from 18s. to one guinea or more.

51. Greater maple, or sycamore (*pseudo platanus*), in the coal and slate tract; less frequent on limestone. In much request for dairy vessels, turnery ware, &c.

52. Lesser maple (*acer campestre*), in most woods and hedges; less common in elevated situations. Wood harder, and finer grained than the sycamore.

53. Black poplar (*populus nigra*), on the limestone soils of Glamorgan, &c.

54. White poplar (*populus alba*), a few on the red sandstone tract, &c.

55. Trembling poplar, or asp (*populus tremula*), the most frequent of poplars; troublesome near grass lands, owing to its numerous suckers; useful to be planted on the brinks of rivers that damage lands during floods. It is scarcely of any other use. Its timber makes boards of inferior quality.

56. Alder (*betulus alnus*), very common on the moist and coal soils of the coal and slate tracts; never on limestone soils. It composes entire fences, on the brinks of brooks, &c. In river fencing, it grows from cuttings, but not so prosperously as the willows and

poplars. When removed into a staggard fence, they ought to be grubbed and transplanted early in winter, to ensure their growth. When plashed, they make a strong fence; and being unpalatable for cattle, they are seldom injured by their browsing. Its larger timber trees are converted into coffin-boards, waggon-chest boards, water-pumps, and pipes under ground: its smaller trees make ladders, rails, lasts for cordwainers, heels for women's shoes, blocks for hatters, pitwood for the collieries, &c. Felled in May or June, and peeled, the wood is more durable.

57. Birch (*betula alba*), chiefly on upland situations in the slate and coal tracts; will make immediate fences in the colder regions and poorer soils, when transplanted from woods as full grown staggards, and where few other shrubs would live. On better soils, it is not recommendable as a fence, as cattle are too fond of browsing it. Boards for carts and waggons, fellies for wheels, yokes for oxen, &c. are made of its wood; and wine of its vernal juice or sap. The weeping birch seems to be only an accidental variety, occasioned by difference of soil, situation, age, &c. The amateurs of woody scenes, lament that they are never seen on calcareous soils.

58. Wild Cherry, or mazard (*prunus avium*), in woods and hedges, on dry soils; large and fine-grained wood. An entire fence of it, between Milford and Little Haven, in Pembrokeshire.

59. Yew (*taxus baccata*) here and there in woods and hedges, in all tracts and soils; in some places it grows out of the most perpendicular limestone cliffs. It attains extreme old age, grows very large, and its wood in cabinet-work is of far superior beauty to mahogany. Its dried leaves are poisonous to pigs, cattle, &c.

60. Lime-

60. Lime-tree (*tilia europæa*), on the red sandstone tract, and in sheltered dingles.

61. Small-leaved lime-tree (*tilia parvifolia*), on the red soil tract, near Crickhowell, &c.

62. Linden or Teil-tree (*tilia* \*\*\*), in Welsh, *gwag-hwyfen*; or bastard elm; about Pont Nedd Vechan, in the coal tract; in dingles on limestone, near Penarth, in Glamorganshire; in several places on the slate tract: a large tree.

The slate and coal tracts exhibit fewer varieties of woods and shrubs, than the tracts of red soil and limestone; the latter being more genial to the production of the more delicate kinds. "In no part of South Britain, have I observed such great and beautiful varieties of copse and brushwood, as in Glamorganshire; excepting the counties of Gloucester and Somerset, which in this respect are similar."—*E. W.*

Having enumerated the several varieties of wood, underwood, &c. which compose the fences in the greater part of most of the six counties, we next proceeded to describe the state of these fences more particularly. In the Vales of Glamorgan, Towy, Wye, Usk, and Teivy, &c. fences are commonly of very luxuriant growth, and frequently too much neglected, being permitted to run up from 15 to 20 feet high, and in some places much more. In some of the most sheltered parts of Glamorgan Vale, &c. they cover an extravagant breadth also, insomuch that they may be considered as affording, not only harbours for foxes, but also for elephants, were those animals natives of the country; but since the advance of rents is becoming every where more general, they may be expected to be soon reduced to proper dimensions. The offal



wood obtained by such reduction, would afford valuable fuel for the purposes of the dairy, &c.

In some parts, *plashing* of hedges is regularly attended to. Mr. Clark, in the Original Report of Brecknockshire, p. 13, 14, says—"when the field is in wheat, the hedges are then *pleached*; that is, all the dead and superabundant wood is cut off from the hedge. The tall branches are *half cut*, but not wholly so, because it is intended, that when they are laid along the stakes, new sprouts may issue from them in this horizontal direction, the sap having still a passage from the parent root, by the half that was left uncut, to invigorate these young sprouts. Since the hedge undergoes this operation every six or eight years, the country has a neat *husbandman-like* appearance, and banishes from the spectator those unpleasant sensations of indolence and slovenliness, which the sight of overgrown hedges round small enclosures must ever inspire."

It should be observed, that this operation of *plashing* fences is not confined to Brecknockshire; it is a practice well known, and in use in every part of Wales, where such fences are in being. In bending the stem to form the wattle, there is a proper angle to be observed, which the labourer knows pretty exactly by the guess of his eye. The angle 20 degrees is too flat, though common in some parts, as it keeps off air and rain from the lower stems, and affords too ready a step for unwelcome passengers. From 28 to 32 degrees seems to be the proper angle. Angles approaching 40 degrees are too erect to form a strong wattle or fence. When fences so plashed are neglected, they soon again run wild, and require a repetition of the operation; therefore

therefore to remedy this inconvenience, *trimming* or *pruning* is an annual practice which succeeds the plashing of hedges. That operation continued, the hedge becomes a permanent fence, the best and cheapest of all others, where the offal-wood cut off by successive plashings is not an object of consideration, either for fuel, or for trowse in other modes of fencing. Several of these fences, trimmed *cap-à-pie*, are observable in the counties of Radnor, Brecknock, Glamorgan, and Caermarthen. To the farmers of the latter county, D. T. about 1720, pays a compliment, for the neatness of their quickset fences—

*"Gwryboedd union gwedi eu plannu  
Am byn yw'r brwmyn goreu ynghymru."*

For fences straight, where quicks abound,  
None equal hands in Wales are found.

Indeed the farmers of Caermarthenshire still bear away the palm for fencing from their neighbours on the borders of Pembrokeshire: though this practice of plashing and *trimming* hedges now extends into the latter county and Cardiganshire, especially adjoining public roads and near mansion-houses. In Gower, in Glamorganshire, it is more general over entire farms than any other parts we have noticed; and though to the admirer of landscape and nature in its wildest garb, it may appear of a dull uniformity, inferior to the overgrown neglected fences of the Vale of Glamorgan, and other parts; yet to the farmers who adopt it, it is undoubtedly of very superior utility. Live stock are thereby kept entirely in the dark what kind of grain grows the other side of the fence; the hedges are kept within their proper limits; and it almost entirely removes the objection farmers in open countries, in

England and elsewhere, have against fences in general, that they damage crops of grain by their over-much shade. However, in several instances, we have noticed the *trimming* of fences to be carried to a culpable extreme, by being kept too low, on the sides of roads and elsewhere. Some few inches additional height in a fence, cannot considerably obstruct the progress of air to dry the roads, &c. ; but the want of those few inches in height may occasionally cause damage to the adjoining crops. The summit of a trimmed fence should never be within the reach of any beast, which, by browsing it, may be tempted to get over. In several places, adjoining public roads, the road side of the fence is always in a trimmed state, whilst the field side is permitted to run wild, to grow trowse for dead hedges, fuel, &c.

Mr. Clark, in Brecknockshire, before quoted, accuses the farmers of that county of a predilection for *crooked* fences. "The hedges, (says he, p. 14), are formed of different curves. Scarce ten yards of a straight hedge to be seen together in the county. This adds much to the beauty of the country, and to the inconvenience of the ploughmen. Beauty, however, is not the farmer's motive in persevering as they still do in making their hedges *crooked*. The popular, but erroneous idea prevails here, "that a crooked hedge affords more shelter to the cattle than a straight one." Mr. Clark next goes mathematically to work, to prove that ten thousand turns in a hedge do not afford a greater degree of shelter than if it had been comprehended under four straight lines, or any other regular figure.

All this is vain speculation founded upon an erroneous statement. There are no farmers in Brecknockshire,



shire, or any other part, who make *new* fences crooked by choice; excepting in very few instances, and those under peculiar circumstances; such as in new enclosures intersected by deep ravines or gullies, which in such places are the most advantageous situations for fences. As the shelter therein afforded them, will ensure their speedy growth, the fosses of the fences will take in all the drainage water, with the least expense, and the least possible waste of land. But in other situations, the fencing labourers, &c. aim at marks as uniformly straight as the line of a musket ball. That *crooked* fences every where exist, in *old* enclosures, is too true; and the apparent cause of their being so, has been explained in the Section on *Enclosing*; but so far from farmers any where preferring crooked fences, that their number is annually decreasing. Excepting where they are boundaries of property, and mutual accommodation between proprietors not easily attainable, crooked fences are frequently either annihilated where not wanted, or formed anew, by being transplanted as staggarads into straight lines; as the dullest rustic in the country knows that he is obtaining an acquisition of land by it; and rural beauty, in an agricultural view, the only view with which we are concerned, is increased rather than diminished by the improvement.

There are two methods pursued in forming new quick-fences. 1. By raising hawthorns, &c. from seeds, in nurseries, and transplanting them at from two to five years old, as circumstances happen, into the new line of fence, where they are protected until full grown by posts and rails, dead trowse, mounds of earth, &c. The most general and effectual protection are posts and rails, which generally last until the fence undergoes the operation of plashing before described. They must,  
previous

previous to that operation, be removed; and from thence forward they are unnecessary. This is the most general method on enclosures of large tracts; especially in places where underwood for the second method is not procurable in large quantities.

The second method is forming a fence of staggarads, called by some Welsh, quicksets; which are sizeable bushes of hawthorn, blackthorn, hazel, briars, &c. grubbed up in copses, useless hedges, &c.; carried to the spot, trimmed, and set in their proper situations. It need scarcely be added, that varieties of plants are adapted to varieties of soils; thorns, hazel, the dog-rose briar, &c. to dry soils; willows, alder, the green stemmed briar, &c. to wetter soils; though in wet lands, the mounds being raised 2½ or 3 feet high, they soon become sufficiently dry for any of the hardier plants. Bad soils of stiff clay, rammel, &c. are by some thrown up into a mound doubly faced with green sods, and let to remain so over winter, to be ameliorated by successions of rains, frosts, and thaws,—to be dug and tilled early in spring, before the frosty season is over,—and in March to plant the sets. Mr. Clark, in Radnorshire, p. 39, recommends the amelioration of such sterile and stiff soils by lime—“Should the waste and other neglected lands, ever be enclosed, it has been observed that it would be difficult, if not impossible, to get quick hedges to grow in many places. In order, therefore, to insure the health and prosperity of the quicks, a small quantity of lime should be mixed with the mould, in which they are placed. This, in all reasonable degrees of elevation, will be a certain means of insuring their growth; as has been experimentally found. In wet land, the lime would have little effect; but tallows and other aquatics should be planted there.”

Wet

Wet land thrown up into a mound between two sod-facings, as before mentioned, would soon be sufficiently dry; and on such a soil, lime would have the most visible effect.

Farm-yard manure has been applied to hungry soils, to prepare it for the reception of hawthorn quicks. But soil and dung so mixed should undergo some courses of tillage, in potatoes, &c., so that no dung should appear, save in the more carbonic colour of the soil, when the quicks are planted.

Staggard fencing is the most common method in the woody tracts of North Wales, in the counties of Radnor and Brecknock, the mountainous parts of Glamorgan, and in Caermarthenshire. With the addition of dead trowse, either stuck uprightly into the mound, or laid inclining, and fastened with small upright stakes, it makes an immediate fence. In well wooded tracts, posts with one rail are added, which secures the fence, and renders its growth more speedy and certain. These staggards seldom fail to grow, when well managed; excepting the first summer after planting be a very dry one. Hazel frequently produces nuts the first summer, and those of superior size. Where the fencers have choice of plants, they mix the spinous sorts, thorns, briars, &c. as alternately as possible with the unarmed kinds. Young plants are of more certain growth than old strong staggards, they are therefore carefully intermixed: and small briars, hawthorn, &c. either from woods or nurseries, are frequently planted near the surface of the mound, opposite or sidewise, close to such strong ones, as are likely to decay; and even these, apparently dead, frequently produce numerous shoots from the roots, the second or third year after planting.

Young



• Young plants from nurseries, &c. are provincially called *hand-sets*; and grown bushes from woods and hedges, are denominated *staggards*\*. Varieties of methods, in planting each kind, obtain in various parts of the district; some methods commendable, others quite the reverse. Nature seems to be too little attended to, as the director-general in planting. Crushed roots, and those of superfluous length, should be pruned, as obviously as a gangrened limb should be amputated, to secure the life of the body. High mounds, in situations where fields *cannot* be otherwise securely fenced are indispensable; but to erect them for any plants, excepting furze, appears to be wrong. The soil of such raised mounds, in dry situations, soon becomes too effete to afford nourishment for vigorous plants; they either linger, or wither and die; especially if the breadth of the mound be not adequate to its height: and, in dry soils, such a breadth would be an evident waste of land.

In countries where quick-fencing is best understood, *staggards* are planted a spit deep in the natural soil. The roots then are imbedded in the very centre of what fertility the soil possesses; whether from inherent quality, or acquisitions from the atmosphere†. Depart from this rule, dictated by Nature, and plant lower in the ground, or higher on the top of an elevated mound,

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\* Probably from their similarity, when their tops are cut, to the horns of a *staggard*, a male deer of four years old.

† Where the soil is not of a sufficient depth, a spit deep is thrown from the foss upon the central sward, to augment the depth; and the *staggards* are planted thereon. A greater elevation than this for quick-sets, is considered as approaching too near the mound-method of fencing.

and the consequence, an obstructed growth, will follow.

Another error in planting, is that of using a dibbler for hand-sets, instead of a spade. Dibblers may do for beans, and other garden articles; but they should never approach a fence or a nursery. Drills made with spades are far more preferable. In them, the lateral and tender roots are permitted to retain their natural position; whereas by dibbling, the roots are confined; and what is worse, are forced to positions the very reverse of nature. Labourers by the rood, however, prefer dibbling, because they do the work quicker. The prices of hand-sets per thousand, and the price of labour in fencing, vary in different parts, according to the state of agriculture, and the vicinity of manufacturing places.

*Stone-wall Fences.*—*Lime and stone* fences are but seldom made, excepting near mansion-houses, around gardens, and farm-yards, &c. For general farm fences, they are too expensive; and it is at least quite as well to support the poor by employing them in the reparations of dry walls, as from the parish rates; which in a considerable degree will always be the effect of everlasting works, in fences, or in any thing else.

*Dry stone walls* are most common in the red sandstone and coal tracts, where flat slate-like stones abound, and are formed around parks, lawns, and mountain farms, and in other naked tracts of West Wales, where they are more plentiful than underwood. In Glamorgan Upper, the expense of erecting them is 1s. per perch of 18 feet, for every foot in height; breadth of the wall at bottom two feet, at top eighteen inches; so that a wall of five feet high, will cost 5s. for every

every six yards, exclusive of carriage; which is equally expensive with working in mortar in some other places.

William Edwards, the celebrated Glamorganshire bridge-builder, went through his noviciate in masonry, by repairing the dry stone-wall fences around his mother's farm. He was afterwards employed in the same kind of fencing by his neighbours; until at length he became ranked amongst the first architects in Europe.

Stone fences, in western exposures, adjoining the sea, as about Stackpole Court, Brownslade, &c. in Pembrokeshire, have their copings surmounted with upright stones, at some regular distance from each other; which are supposed to check the force of the western wind against buildings and plantations, by dividing it.

*Naked Sod-fences*, or stones and sods in alternate layers, are most common on the western coast of the district, or that tract which skirts St. George's Channel from Milford to the mouth of the Dovey.

Entire sod and mould fences are raised five or six feet high, on a base of as many feet wide, sloping to three feet, two and a half or two feet at the top, with double facing of green sods. They are thus effectual fences; but the tracts where they appear have a dreary look, from the want of hedge-wood, and the verdure of quickset or copse-wood fences.

Of late years, it has become rather a common practice to plant, or rather to sow furze (*ulex europæus*) on the tops of these mounds.

Mr. Lloyd, in Cardigan Lower, p. 13, says, "When the hedges are made of alternate layers of sods and long stones (the length of stone running towards the centre of the hedge), they are very durable, and proof against every thing but sheep. They are formed



formed upon a base of six or seven feet, four and a half or five feet high, narrowing to the top, upon which white and black thorns are planted: in exposed situations, their growth is slow." And no wonder! but the cause of the slowness of growth is not exclusively the exposed situation, but rather the elevation of the dry bank or mound on which they are planted. Mr. Lloyd proceeds—"Furze thrive well; but when they come to any size, they are apt to shake down the banks of earth, that are not supported by layers of stone."

Another objection against a single row furze fence, is, that they grow lengthy, decay, and open at bottom between the stems, which afford passage for sheep. To remedy this defect, double and treble rows of furze are sown, and the rows are cut, or hogg'd, as they provincially term it in Pembrokeshire, alternately, in succession, as they approach maturity. This hogging takes place as early as possible in the spring, so that the frost be well over, otherwise the furze will die. They will soon after spring up very vigorously. These rotationary clippings will supply fuel perpetually upon a farm of some extent, and will moreover preserve the fences in permanent repair. A furze fence of this kind in the western part of Gower in Glamorganshire, had two rows on the summit of the mound, and three rows along the slope or batter of each side. This formed so formidable a fence, that, in the opinion of a Gower gentleman in the neighbourhood, "the d—I could neither go through, nor get over it." "Good news for the world," said a by-stander, "What man of common sense would not so hedge himself about?"

In situations somewhat exposed, the larger ulex or furze is found too tender to grow well on the northern side of the high mounds: the smaller furze, with the  
hardy

hardy briars and brambles, might succeed ; and, by the intrusion of their roots into the mounds, render them more durable.

In numerous instances, the mound has two rows, one of hawthorn, and the other of furze : some very effectual fences of this kind were observed in Cardiganshire.

In working the facings of naked mounds, &c. the sods are laid with the grass outwards, in regular horizontal courses, in the manner of what masons term half-random courses ; which, when finished, and the grass a little grown, has a neat appearance. But it is too common, that the sods are cut perfect parallelograms, with square angles, *Fig. 1.* ; which being put together in a moist state, the perpendicular joints open, by the shrinking of the sods, when the weather becomes dry ; and the fence exhibits an unsightly as well as a ruinous appearance. This effect is prevented in several places, by cutting the sods with oblique angles, so that each sod forms a rhomboid, *Fig. 2.* ; and these well jointed, cannot open by the drying of the fence ; for whatever shrinking takes place, it is all perpendicularly, and not laterally. It is a practice with some fencers, to lay each successive course of sods about an inch more inward than the former one ; by this means, each course has its due share of rain to the roots of the grass.

Fig. 1.

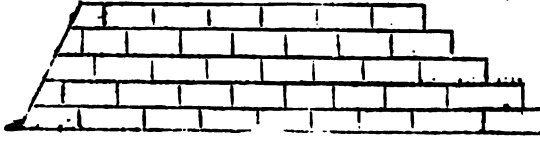


Fig. 2.

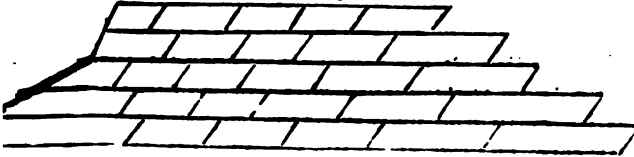


Fig. 3.

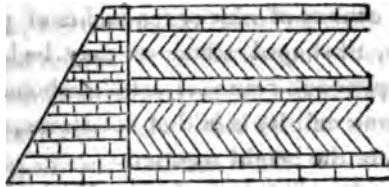
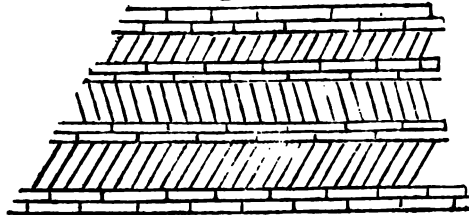


Fig. 4.



In the three counties of Pembroke, Caermarthen, and Cardigan, these mounds are frequently faced with stone; in the Roman method of walling described by Vitruvius, and indeed as seen in many old Roman buildings; the ruins of Segontium, Richborough Castle, St. Albans, &c. Penline Castle, Cogan church, &c. in Glamorganshire.

The herring-bone courses, as they are called, are covered with horizontal courses of flat stones, sometimes two courses, sometimes one; and thus working



for as many courses of each sort, as may be necessary for the height required, *Fig. 3, 4*. This mode of walling is worthy being recommended into more general use on the mountains of the red sandstone and coal tracts of Brecknockshire and Glamorganshire, where flat stones of micaceous schist are so abundant.

The mound facings are sometimes formed of flat stones laid in vertical courses, sometimes a little inclining; these latter require stronger abutments than either the vertical or herring-bone courses.

A second method of walling, where flat stones are not procurable to work the herring-bone masonry, is to build in courses of nine or ten inches of pebbles, or any rough, ill-shaped stones as may be had on the spot, and upon each course of pebbles a bonding course (as the masons call it) is laid of flat stones, and so on, alternately, to the height required.

Thirdly, where flat stones for bonding courses cannot be had at any reasonable distance, their place is supplied by *sods*. The base is made about three feet and a half wide; the top from twenty inches to two feet. Where a greater height than four feet is required, the base should accordingly be wider. Four courses of such ill-shaped stones, at about nine inches each course, and four alternate layers of *sods*, about five inches thick each, will amount to a height of about five feet. When a course of from six to ten feet in length has been laid, whether of stone or of sod, wooden beetles are used to consolidate the work, as it advances. The middle space between the two facings, is filled with rubbish of *sods*, stones, &c. well rammed. Where strong argillaceous earth is to be had, it is an advantage. The *sods* of light sandy soils, where none better can be had, are used for alternate courses with stone; and the roots of vegetables in the *sods*, send forth abundance  
of

of flowering plants and grasses, pleasing to the eye, and affording additional stability to the fence.

In the lately enclosed tracts about St. David's, mounds of earth faced with alternate layers of stones and sods, have been justly preferred to the common dry stone walls, especially when the size and shape of the stones are considered. A Welsh adage says,

*Galed ar galed  
Nid tadarn y pared.*

i. e. Hard upon hard, never makes a firm wall.

Masons are occasionally employed; but in general, common labourers do the work neatly and expeditiously. The average expenses will be entered in the Section on the *Price of Labour*.

It is a matter of regret, however, that in these naked tracts, furze has not been sown on most of the mounds. This is wrong, as it is a plant that grows well in sea air; and hedges of it make better fences, and give greater shelter, exclusive of the periodical supplies of fuel they afford, in a country where that article is far from being abundant.

*Fences on the Sea-coast.*—The encroachments of the sea are checked, for the major part of the whole extent of the district, by rocky cliffs of from a few feet to 40 yards or more in depth. On the south, the cliffs consist of varieties of limestone, and coal-measures; on the west and north-west of coal-measures, sandstone, argillaceous schist, with varieties of siliceous rocks.

Beginning eastwardly in Glamorganshire, the first flat tract, on which the sea has encroached, and where possibly it may encroach more; commences at the termination of the limestone tract, near Sker \* Point, and

\* Or Skeir, probably from *Esgair*, a leg; a jutting promontory, &c.

continues the space of about twelve miles to Briton-ferry, at the mouth of the river Neath. " Tradition informs us, that the old town, castle, and church of *Kynffig*, were inundated by a great storm, leaving the buildings overwhelmed by the sands; and evident marks of this calamitous event are visible, and prove the circumstance beyond contradiction. A great quantity of human bones are often discovered by the drifting of the sands. This storm, which has given a new and desolated aspect to a great tract of country, happened during the last year of the reign of Edward the Sixth; or immediately on the accession of Queen Mary; in the first year of whose reign (1554) ' An Act touching the sea-sandes in Glamorganshire,' was passed; wherein an Act of the 23rd of Henry VIII. is recited, which provides for Commission of Sewers, and that the said Act does not extend to reform the damage done by reason of sand arising out of the sea, and driven to land by storms and winds; whereby much good ground, lying on the sea coasts in sandy places of this realm, and especially in the county of Glamorgan, is covered with such sand, to the great loss of the Queen's subjects; and more is likely to ensue, if speedy remedy be not provided:—and enacts, that the said Act of Sewers and Commissions shall give full power to the redress and securing of the said grounds from hurt and destruction by reason of the said sands. Empowered by this Act, a Commission was holden to re-ascertain the boundaries between the parish of *Kynffig*, and the extra-parochial farm of *Skerr*, which had been so overwhelmed with sand as to leave no trace of the ancient limits."—*The Rev. J. Morgan, in Carlisle's Topogr. Dict. of Wales.*

The sandbanks checking the progress of the tides  
into



into this flat tract, gradually accumulated, since the inundating devastation above described; and, to render them more firm, they are matted with the roots of the sea mat-weed, *arundo arenaria*, called in Welsh *môr-hesg*, *myrydd*, and *mer-wydd*, all of the same import. Tradition imputes their first planting here to the *Monks of Margam*; but there is no foundation for such a supposition; as it is an indigenous reed, found everywhere on sandy sea coasts. The Monks, most probably, encouraged its more extensive cultivation; and their successor to the Margam property, the present proprietor, the Hon. T. Mansell Talbot, binds each of his tenants, who rents land in the adjoining marshes, to give yearly the labour of a day or more, in proportion to his holding, as a kind of statute duty, for the planting of this reed; and experience has proved its good effects.

The same improving proprietor fenced out the tides from Oxwich Marsh, a flat tract of about 200 acres, near his elegant mansion, Penrice Castle, in Gower. The fence is a mound made of the materials on the spot, and covered with a sward of marine plants. A large channel is cut through the central part, and another on the north side, between and the dry land, the contents of which are emptied into the adjoining pill by means of iron valved flood-gates. Twenty years back, before the tides were excluded, this marsh afforded healthy pasturage for sheep; but it is now quite the reverse, as they are invariably infected with the rot, if permitted to graze upon it. It is now, however, become excellent pasture land for cattle and horses.

Adjoining the marshes of Margam, above-mentioned, stand the Margam copper-works. The slag refuse of

the furnaces has from time to time been carted, at the direction of the managers, and laid down so as to form an effectual and well shaped pier; and in a direction well calculated, were it persevered in, to exclude the tides from the extensive marshes to the south-east; as well as to concentrate the briny water, by confining it to a bason and channel, for the mooring, ingress, and egress, of vessels employed in the copper and other trades. It is to be wished that the spirited proprietor of the marshes would grant a lease to the managers of some of the most contiguous parts of the marshes; which is all the remuneration they wish towards completing this pier of metallic scoriz; which, when finished, would extend from the copper-works, in an oblique direction, across the wet sands, to the elevated sandbanks on the coast.

The *arundo arenaria* is every where the protector-general of arid sandbanks, from being demolished by the impetuosity of winds and tides. The minister of Aberavan in Glamorganshire, in his correspondence with Mr. Ed. Lhuyd, about 1690, says:—

“ Banks and sluices keep the sea from overflowing all Aberavan Marsh. In the middle the sea is checked in its progress by the matted roots of a certain plant called *myrydd*, which the tides in other places keep from growing.

On the river Burry, and the bay of Caermarthen, from Llychwyr to Kydweli, are several extensive salt marshes; and the spirit of general improvement, of late so actively awakened in that quarter, it is confidently expected, will, ere long, bring them within embankments.

On the north of the bay, Laugharne Marsh, being

2000 acres of excellent soil, exclusive of a large sandy tract, has been embanked several years ago; and lately went under considerable improvements.

Castle Martin Corse, in Pembrokeshire, is a tract similarly circumstanced: but as these topics are better adapted for the Chapter on *Improvements*, we shall here proceed no further.

*Woods and Quick-Fences, within the influence of Sea Air.*—Much has been said and written on the kinds of trees and shrubs, which are supposed best adapted, by some peculiarity in their constitution, to withstand the effects of sea air. The effect is evident; but unless we enquire rationally in what manner that effect is produced, our theories will be but baseless fabrics, similar to what are vulgarly called—"castles built in the air." Zephyr's and Auster's genial gales, with reference to their supposed effect on woods and hedges, have been rudely and wrongly called—"pestilential blasts." Some attribute the immediate cause to the salinity of moist sea air; others to the frequency of west and south-west winds. Their genial effect upon vegetation, on sea coasts, in producing *early budding*, is the remote cause; but the intermediate agent between the remote cause and the effect upon trees and shrubs, fully exposed to southern sea air, is *frost* late in the spring.

"As the spring is the season most favourable to the production of new parts in the vegetable economy, it is then that we first perceive what is called the *eye* of the *bud*, within the axillæ of the leaves, or that angle formed between their base and the branch. In the course of the summer the *eye* enlarges, and becomes a *bud*: it continues to increase during the autumn, and in winter falls into a state of torpidity. In the ensuing spring,



however, it revives, and expands into a shoot, or succulent-branch, which acquires solidity in the summer, and becomes clothed with leaves or flowers \*.

Sea air, especially from the southern quarters, promotes every kind of vegetation, which includes the expansion of buds; and that often, as it afterwards turns out, prematurely; when they are blasted by the first hoar-frost in April, or even in May. The sea-side of trees and hedges, whether of southern, western, or any intermediate exposure, buds earlier than the land-side; and for that reason is more liable to have its embryo of branches and flowers killed by frosts: and the land-side, being later in the expansion of its buds, stands more upon a level with the trees and shrubs of inland situations. When the early buds are once destroyed by frost, at the first return of genial warmth, Nature seems to multiply her efforts towards reproduction; and by a renovated vegetative power, throws out numerous infant buds, some of which, at the following season of spring, share the fate of their predecessors; others, lying more concealed, escape the effect of the frost, and arrive at a dwarfish maturity. Buds at the extremities of the branches, are generally the first to expand, and the first to fall victims; which seems to account satisfactorily for the stunted and closely sheared appearance of woods and fences in full marine exposures. This also accounts for the angle, or obtuse bend, observed in solitary trees within the influence of sea air. The leading branches on the sea-side, and on the crown, are checked, owing to a premature budding; when a lateral branch, on the northern or eastern side, assumes the lead; (not so forward in the spring), and continues as such, in an horizontal direction, and of a haggard appearance.

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\* See *Bud*, in Rees's New Cyclopaedia.

A lecturer upon this subject should fix upon Margam in Glamorganshire, for his residence. The forest trees, of all kinds, on the flat near the Abbey, are the most lengthy, upright, and vigorous, in the Principality; whilst the extensive wood of oak, about 80 acres, on the adjoining steep declivity, facing the adjacent Bristol Channel, has its matted surface as regularly level as a newly mown meadow, or (*magna componere parvis*) an annually clipped hedge. The land-side of the oak trees in this wood have, however, a grand forest-like appearance; and the closeness of the trees prevents their bending in angles, as solitary trees, in similar situations, generally do.

Hedges upon flats, near the coast, with their sides exposed to the sea, are more stunted and clipped than those of a contrary direction. A laterally exposed quick-fence, in such a situation, exhibits the outlines of a right angled triangle; whereof the sea-side forms the hypotenuse, and the land-side the perpendicular. Fences so circumstanced, are, however, generally impenetrable; and save the expenses of shears and clipping.

“In places exposed to the western and south-western sea winds, such as the coasts of Cardiganshire and Pembrokeshire; I have seen nothing planted with success for fences, beside the humble furze. I have observed, that the sides of hills gently sloping towards the sea, are in general more favourable to the growth of quick fences, than the uplands, though several miles inland; and those uplands pretty level, as in Cardiganshire, which has, in general, a kind of undulating surface. I suppose that, in the former case, a re-action of the wind takes place from the side of the hill to the plant; whereby

by it grows straighter than if no hill presented itself to reflect the current of air."—*S. LI.*

If the hedges on the sloping hills above mentioned were in the direction of the sea air; that is, from west to east, or from south-east to north-east; and the hedges on the more distant and elevated table land in a contrary direction, facing the sea, the inferior growth of the latter has been already accounted for. That the "humble furze" is the only shrub planted with success for fences, may have been observed by others; but it forms no general rule, and has no foundation in nature: that it can be raised with less trouble and skill than fence plants in general, may be more readily admitted. Within these few years there were no nurseries in South Wales for the public sale of forest trees and quicksets; now they are becoming numerous, from Cardiff to Newcastle Emlyn on the Teivy; and it has in several instances been proved, and will progressively be further demonstrated, that there are but few indigenous trees and shrubs that will not grow in sea exposures. Our western sea coasts in Dimetia, are dreary and open, more owing to want of human exertion and skill, than to any natural cause whatever. Plants carefully raised; transplanted repeatedly, to increase and invigorate their lateral roots; and removed with skill and attention into a fence or plantation, before they are of such a growth as to be violently shaken by winds, and in a soil not absolutely sterile;—their growth would, it is confidently presumed, be insured by experienced nursery-men at a very low rate. It may be objected—"that sea winds shake and unroot the newly planted fences"—Inland winds may do the same; but prevent the injurious effect as much as possible by planting them before



fore they are overgrown; and above all, and over all, preserve them from the browsing of any animals, otherwise all labour will be in vain.

It has been already noticed how spring frosts check the longitudinal growth of trees and shrubs within the influence of sea air; but those frosts do not kill the plants; they cause nature to open new channels of vegetation, to form a more matted surface than that of inland plants, and consequently cause them to be better adapted for fences. Checking the longitudinal growth, is injurious to forest trees; but matting the lateral surface is rather of service to fences.

The falling of the leaf in autumn, is a season of observation on this subject, as well as its budding in spring. The 18th of September, the sea side of sycamore trees near Briton Ferry was observed to have been stripped of its foliage by the preceding night's frost. The leaves covered the road, in brown maturity; whilst those on the land side of the same trees stood firm on the branches, and nearly as green as in July. Each tree exhibited a Janus-like appearance, having a winter face on one side, and a summer face on the other. The observer could not fail attributing this difference to the earlier budding, and the consequent earlier ripening of the leaves on the sea side. Ash trees on the same spot were not nearly so much affected as the sycamore.

Gentlemen of observation, and skill in botany, are the best qualified to fix upon trees and shrubs best calculated for sea exposures. Upon the foregoing theory, the trees, &c. latest in budding ought to be selected; that the frosts, upon the average of seasons, may be well over before the expansion of buds into tender shoots takes place. In order therefore either to explode or confirm the foregoing theory, that spring frost, and not

sea

8  
sea air, is the immediate cause of checking the growth of trees exposed to it; observations should be made on the growth of trees on different sea coasts of various aspects. If sea coasts of southern and western aspects produce earlier buddings than other coasts facing the north or the east;—does it not follow that trees in the latter aspects are less affected in their growth than those in the former? One case in point may be offered as a solution to this question. Oak trees, near Dulas Bay in Anglesey, with the Irish Sea closely adjoining to the north-east; nevertheless bent angularly towards the cold point; the effect of which, preventing too early budding, superinduced a degree of growth and extension to the branches on that side; which, owing to the vicissitudes of temperature, had been denied to the earlier budded branches of the south-western side; though the wind from that point had the whole breadth of the island to blow over before it reached the trees.

*Opinions and Observations on the Selection of Trees and Shrubs in Sea Exposures.*

“ On the west of Cardiganshire, in a quickset hedge of seven or eight years standing, in a full sea exposure, observed among the sets a few birches, brown willows, elders, and furzes, to be the least affected.”—*E. W.*

“ Plane, sycamore, wild cherry, firs, pines, larch, grow well.”—*J. D.*

Which are the hardest trees on the sea coasts?

Ans. “ *Elm*; and next to that, *Ash*.”—*Rev. J. H.*

The same observation was made at Clasemont.

“ Trees and shrubs that bear the sea air—are elder  
the kinds of willow, service, mulberry, myrtle, syc  
mor

moar, yew, elm, privet, wild fig, furze; so the apple,  
 pear, plum, &c."—*T. W.*

Between Haking and Hubberston, &c. "Hawthorn  
 hedges, squatted, or shorn by sea air; elder, willow,  
 and furze, not in the least affected."

*River Fences.*—The rapidity of mountain torrents,  
 in many places, tear and disfigure valleys through which  
 they rush in times of floods. Some proprietors curse  
 the streams, and leave them to take their course: others,  
 of the Capulet tribe, erect jetties, and turn the torrent  
 like a battering ram against their neighbours' land on  
 the other side; who eye these aquatic fortifications with  
 jealousy, and in their turn erect jetties below to turn  
 back the stream; so that in time of flood the torrent is  
 buffeted alternately from one side to the other; but in  
 general it takes ample revenge on both the contending  
 parties indiscriminately. Such rival fences on opposite  
 sides have occasioned vexatious lawsuits. A jetty is a  
 strongly planked timber frame, filled with stones. The  
 torrent in meeting such an obstruction, generally un-  
 dermines the projecting end, unless it rests upon a rock;  
 but if the frame is sufficiently strong, so as to be kept  
 together in any position, it effectually answers its pur-  
 pose. The jetty is placed so as to form an obtuse  
 angle across the near side of the stream; and the more  
 obtuse the angle, the less is the resistance given to the  
 torrent, and consequently the less it will undermine.  
 More acute angles generally occasion a rapid recurrence  
 of the stream around the projecting point of the jetty,  
 and the end aimed at is not so effectually obtained. In a  
 breach of a few hundred yards, several jetties are placed  
 at the requisite distance from each other, which can  
 only be judged on the spot; so that the second jetty re-  
 ceives



oeives and repels the recurrent torrent from the first, and then the third from the second, and so on, until it will have passed the breach.

The intermediate spaces between the jetties are thickly planted, in the gravel brink of the river, with cuttings of willows and alder. The quick growing willows, the hop and the huntingdon, are the best, as they strike root in less time than the brown or Welsh willow. Osier willows intermixed would be of service. In three years, if they succeed well, the whole may be plashed, laying the ends in the direction of the current. Then the steep precipice (*torlan*) is to be shelved down, in an inclined plane, to the willow fence, or low water margin; fixing as many briars, brambles, &c. as possible to grow in the surface soil close to the willows. The surface of the shelved plane should be either covered with sod, or sowed with rye-grass seeds. A side-flood is not likely to do further damage, when the new sward is once formed; but where the breach is cut into a deeply indented curve, and the torrent dashes against it nearly at a right angle, the fencing becomes much more difficult and expensive. In that case, jetties and planting are of no use. Nothing less than a strong cat-tire fence, the whole length, will be of service. A perpendicular walling of stones, let them be ever so large, if laid upon gravel, will be soon undermined. To prevent this, a foundation of piles, from nine to twelve feet long, wattled with trowze, is laid; with rubbish of briars, furze, &c. intermingled with loose stones thrown on promiscuously: on this foundation, old pollard trees are laid in a proper direction, and the spaces between are filled with large stones, with gravel to fill the interstices. If this succeeds, it will soon be covered by the floods with gravel, sand, and grass. In some instances

stances the old channel of the river is re-opened, at a great expense; and even then, without skilful fencing near the entrance, the newly opened channel may be filled up by the first high flood. A moderate flood assists in rendering more open the new channel; but a high flood frequently chokes it, and bursts its way into its wonted course.

Where a river expands over a vast breadth, converting soil into barren gravel, and occasionally damaging both sides; a central course has been cheaply obtained, by laying large stones within a certain number of yards of each other, in the line of direction intended for the future bed: the succeeding floods striking against these obstacles cause an ebullition and plunging, which scoop out the gravel around them, and lay it up in the stiller water on either side, or sweep it away down the current, until the new bed is formed, with little artificial aid; and high floods deposit sediment on the relinquished gravel, so as in time to produce pasture land.

One of the neatest river-fences we observed, was on the Brecknockshire side of the river Wye, between Newbridge and Rhaiadr. James Watt, Esq. the ingenious patentee of Soho, had purchased an estate on both sides the Wye, and expended large sums of money, in all kinds of improvements, in buildings, plantations, wall and quick fencing; the latter had the most expensive dead or protecting outer-fence we any where witnessed; it consisted of cleft stakes of oak, within a foot or 14 inches of each other, closely wattled with strong trowse. It was apparently designed to protect plantations from mischievous sheep, as no other fencing required such an expense. The river Wye had damaged a fine piece pasture land, by undermining the soil of several feet depth.

depth. The outer line consists of a regular row of stones; and close within it is a row of piles and trowze. The precipice was then shelved down to the trowze; and on the inclined surface a reticular fence was made of piles and trowze, apparently intended to check the impetuosity of the floods, and to entangle and retain leaves and sludge brought down by them, so as finally to produce willows and other shrubs. The interstices of the reticular fence are rhomboidal or lozenge-shaped; of several feet to a side.

#### SECT. VI.—GATES.

THE original barriers on openings into fields, in the wooded parts, were trowze and stakes. By frequent removals they were found troublesome; and four or five round poles, let into circular mortices cut with a gouge in posts, succeeded. Then flat cloven rails of oak, let into square mortices, were found more durable: and lastly, gates; some turning on pivots; others suspended on hooks and eyes of iron.

Some ancient plans are still retained. One kind, common in Glamorganshire, &c. has the hind post formed out of a curved piece of oak as angular as the knee-piece of a shipwright. The upper point hangs over the gate, about one-third of its whole length, from which point a bracer extends diagonally to the heel of the fore post. Another, common in Cardiganshire, &c. has the diagonal bracer approaching the shape of the Roman S. These two kinds it is to be hoped will be discontinued; for it gives more trouble to the maker in finding appropriate materials, than it adds to the value of the gates.

of

*Of Modern Field Gates.*—Some are of *cleft* wood, with *five* rails tenoned into both posts; with upright diagonal bracers, on various plans, nailed to the rails: these have but *ten* mortices; are light, but not very strong.

Others of *sawn* wood, have the upper rail of a square cantling, and the lower four rails of inch boards; with one diagonal bracer from the foot of the heel post to nearly the centre of the upper bar; and two upright bracers at equal distances between that and the forepost: the three bracers tenoned into the upper bar: these have *thirteen* mortices; and are the most common in the counties of Brecon, Caermarthen, and Radnor.

Others, have two posts, the upper and lower rail, one diagonal and one upright bracer, all of square cantlings; with the three interior rails three quarters of an inch thick, running through mortices in the square cantlings: these have *twenty* mortices; and are common in Glamorganshire.

To describe all the varieties of gates, would be as endless as useless.

Gates are scarce articles in the woodless tracts of Pembrokeshire, Cardiganshire, &c. In many of the recently enclosed fields under tillage, when sowing is over, the entrances into them are stopped up temporarily with dry walling of stones. This is troublesome and inconvenient; but small farmers, and even small freeholders, after incurring the expense of enclosing, dread the additional, though smaller one, of gates.

Gate-posts may be had of *stones* in all the Welsh counties from St. David's to Holy Head. These columnar stones are of various qualities, coarse argillaceous schist, porphyry, Cornish moorstone, serpentine, &c., with some as regularly angled as basaltes.



## GATES.

An undruidical gentleman near Newport, pillaged Doeten Arthur, a *cromlech* in the neighbourhood, of its massy pillars of green serpentine, to make gate-posts; upon which the author of the History of Pembrokeshire, cried out—"O tempora—O mores!" Holes for hooks are bored into these gate pillars with miners' borers, such as they use for blasting: but wherever they are set, the avenues are generally too confined for the admission of improved carts and waggons; so that when the roads are improved through the country, and improved carts and waggons are introduced, the gate-posts must be set wider asunder to admit them into the enclosures.

In order to procure materials for wooden gates, planting, and that extensively, is the best measure that can be recommended. The *abele*, or Dutch poplar, the black Virginian poplar; the Hop willow, &c. all grow *rapidly* from cuttings of a few inches in length. It would be well, if, in some parts at least, of the new enclosed tracts, they were planted; as in a few years they would be large enough for tolerable gates, hurdles, &c. In sheltered dingles, larches might be planted, which are also of quick growth. The seedlings of them in from 12 to 18 years, might be cut down, and converted into gate-stuff, and other uses; whilst the remaining trees would be permitted to grow to a larger size, for building and other purposes. Such plantations would afford shelter; and be ornamental, if that be of any consideration, in such open, woodless places; where

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\* What would have been our zealous Arch-druid's exclamation, if he had observed the venerable *cromlech*, and its pedestals, in the Vale of Ardudwy, overturned, and blasted into corner stones for a Methodist Chapel?

at present no tree, or shrub, of any kind, is to be seen.

The deficiencies of this open tract, however, as to woods and hedges, are not so severely felt as they would have been in other more eastern districts; owing to its more humid climature. Were woods and hedges ever to flourish here, which too many think impossible, it would be prudent not to over-load the land with them; as it might tend to lessen the produce of grain, of which it now produces abundant supplies, in every instance where tillage is but moderately understood.



## CHAP. VII.

### ARABLE LAND.

#### SECT. I.—TILLAGE.

BY tillage is understood that main branch of agriculture which consists of the treatment of soil in preparing it for the reception of seeds and plants; and the subsequent operations of sowing, harrowing, rolling, hoeing, &c.

The *first*, as well as principal operation in tillage, is that of ploughing; which was the first effort of human invention to supersede the use of the spade, when it was found inadequate to procure means of subsistence for an increasing population. The primary intention of ploughing was to turn the sward undermost, either to cover seed already sown, or to provide a surface of mould to receive in the seed by the subsequent operations of harrowing, rolling, &c. The best ploughing is that which lays the plit in the most advantageous position, or degree of reversion, for the purpose it is intended.

In ploughing ley ground, to be sown on the furrow, and harrowed, the plit ought to be, and by many is, laid, without being either too upright, or too flat; that is, in such a position as completely to conceal the sward, and at the same time to afford a sufficient staple of mould for covering the seed easily and effectually by harrowing. It is agreed on all hands, that the under side of the plit, when cut by the coulter and share, and laid

laid edgewise, or in an inclining position, by the mould-board; should form an angle of 40 degrees with the sole or plane of the furrow from which it was removed. This most proper degree of reversion of the plit, in good ploughing upon ley ground, will be more apparent by the following sketch; which is a counterpart of that sent by Dr. Coventry, of Edinburgh, to Mr. Erskine; and published in the Agricultural Magazine, for August, 1805: it is, however, the reversion angle adopted by all good ploughmen in Wales, since the introduction of the Rotherham plough, improved 30 or 40 years ago.



Fig. 5, represents a ridge of ten bouts, a size proper for dry, level land. A is the flat or first furrow, called in some places the *cop*, or crown of the ridge; and is here represented as it ought to be, flat, and of a small size; the intention of it being different from that of other furrows; namely, to serve as a marking line; and more particularly as an under-ground foundation to prop the two adjacent furrows B and C in their proper degree of reversion; so that their lower angles nearly meet over the cop A. When the harrow operates, it is evident that the cop A will be completely and deeply covered with mould. The best ploughmen prefer the Rotherham swing plough to any other for this kind of work. Good ploughing is the foundation of good tillage\*; and

\* It was a saying among Roman farmers of old (Col. 2. 4.) That a field

and it is a consummation devoutly to be wished, that it were more generally understood and practised. It has, however, begun its tour of Wales these thirty or forty years back; and must be considered as a slow traveller, when it can be confidently affirmed, that it has full three-fourths of the whole Principality yet to explore.

*Speed the Plough*, is a very common optative toast in drinking; but good ploughing requires some stronger stimulant to be roused into action; otherwise it will not complete its Cambrian tour before the conclusion of this century. As farmers must occasionally be bribed to benefit themselves, it may be considered as a prelude to the most important consequences, that *ploughing matches* have been instituted in some parts of Wales, by gentlemen who have both the spirit and the means of supporting them.

It will readily be admitted, that cross harrowing ridges of the above description, will have a speedier effect upon the furrows than a longitudinal harrowing: it is therefore practised upon dry soils, though not generally, when seed is to be covered, and a light harrow finishes the work in the direction of the ridges.

Before we conclude our observations on the semi-

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*was ill tilled, when it wanted harrowing at seedtime.* So with us it may be truly said, that a field in being well ploughed, is more than half harrowed. Anecdotes are of use in rural affairs: Two neighbours, A and B, held farms exactly similar in soil, &c.; their system of cropping was the same. A, went always to greater expense than B in providing manures; and was used to be extremely dissatisfied in finding that B had always equal, and frequently better crops than himself: he could not account for it; but the whole charm lay in B's keeping better ploughs, and managing them better. The Roman maxim—*bene arare—bene arare*, and then *bene sternere*, deserves the highest place in the Agricultural Code.

quadrant



above described, it may be useful  
 experienced ploughmen commit an  
 taking the top slice (A) of  
 and the second furrow,  
 is laid in a similar  
 , and sometimes not;  
 , and the harrows have  
 be only a thin scattering of  
 ward in the centre of the ridge;  
 vegetation will be found to pro-  
 an corn.

kind of ploughing is from eight inches  
 and a half broad, and from five to six  
 where the soil will bear it. The sketch is  
 for eight inches and a half by five.

second kind of ploughing is practised when  
 se strong leys are intended to be fallowed; and the  
 sward wants to be turned down flat, so as to be  
 rtially rotted before the second ploughing takes place.  
 is split is ten inches by four, and more or less, ac-  
 cording to soil and circumstances. Paring ploughs,  
 with circular traversing coulter, are sometimes used;  
 and the plits are sometimes reduced by fallowing; at  
 other times, when ploughed thin, and the soil somewhat  
 dry, they are burned into ashes.

The third kind of ploughing requires a more upright  
 fit; and is practised in ploughing stubbles, to expose  
 the roots of weeds to sun and frost; in cross fallowing  
 the flat plits of the second mode; and in sowing seeds  
 under furrow. Skilful ploughmen do their work so  
 that, that the last furrow of a turnip or barley fal-  
 low, has its surface so regularly uniform as the grooves  
 of a cornice moulding.

*Modes of Ploughing.*—Two modes are distinguished by the terms *casglu*, to collect; and *holli*, to split. The former is that mode which ploughs on each side the cop, or first slice, alternately, until the ridge, of whatever breadth, be completed. The beasts of labour, of course, always turn, at the end, to the right hand of the ploughman; and the finishing plits are on the outsides of the ridge. In the later method, they begin on the outsides, and finish in the centre. In fallowing, and cross-fallowing, both modes are used discretionally. In the first fallowing of wheat stubbles for barley, the ridges are transposed, by coping in each rean. In February or March, it is cross-ploughed, commonly in the splitting mode, at great but not inconvenient distances; and afterwards harrowed: at the seed furrow, the original wheat reans being still traceable, by the *casgliad*, or collecting mode, three wheat ridges are made into one for barley, by coping in the centre of the middle ridge: by the splitting method, a plit is cut on each side of three wheat ridges, and they are formed into two for barley, by having the dividing rean in the centre of the middle wheat ridge; and the animals of draught, of course always turn at the end to the left hand of the ploughman.

This latter mode, in Caermarthenshire, and parts of the countries to the west, is considered as an advantage; as oxen are found more manageable in turning to, than turning from the driver, at the ends: and in those parts they make the ridges so broad, in dry soils, that very few are contained in a field of several acres. They plough a ley, previously limed, or dunged, or both, in autumn, for a barley fallow: it is seldom or never cross-ploughed; and in many places a harrow is not used



used before the second ploughing, which frequently is the seed furrow, in April.

Harrowing would puzzle the ploughman a little, in splitting each of the autumn-ploughed furrows in twain. This, when we consider the awkwardness of the plough in common use, which has been described in Chapter V. is a feat of no mean dexterity; and reconciles us at least to the ploughmen, let our opinion of the plough be what it may.

In the eastern counties, since horse-teams have had the preference, the collecting mode of ploughing predominates for the seed furrow; and the splitting mode in cross-ploughing fallows, for barley, &c. However, in cross-ploughing with a two wheeled plough, there is an obvious inconvenience in turning at the ends by adhering to the splitting method, owing to the unequal diameter of the wheels: the land wheel, of smaller diameter, conducts, or rather obstructs the plough in turning to the left, by the splitting method; whereas the furrow wheel, of larger diameter, conducts the plough without obstruction, in turning to the right, by the collecting method; though many farmers have had such wheel ploughs in use for many years, without noticing this obvious distinction. With such ploughs, servants should be ordered to turn always on what they call the *gee* turn, and not on the *come hither* turn.

In a team of four or five horses in length, in turning at the ends, the rear horse has not only the whole draught of the plit, which is frequently deeper than in any other part of the field; but, too commonly, he has also to counteract the traverse draught of the other horses already turning round. This is owing to the common narrow breadths allowed to headlands; which might be left of double the usual breadth without any loss



loss of crop, and without so much endangering the eyes and limbs of horses in the thorns and briars of the hedges, into which they are frequently driven.

*Depth of furrow*, in deep sound soils, admits of varieties, without inconvenience, or causing hesitation. From four to six inches is the general average; adapting the depth to the crop, to the state of the soil, climate, &c. In the Vale of Glamorgan, the substrata of limestone frequently undulate more than the surface soil, owing to the perpetual tendency of the latter to become more level: hence the tilled soil is much more shallow on the convex parts of the undulating substrata than on the concave parts. Seeing wheat sown upon a shallow ley furrow, in October 1811, and enquiring why they did not plough deeper and better, the reply was—that they would by ploughing deeper turn up an under-stratum of *yellowish clay*, which they considered as injurious to the crops. This clay is evidently calcareous\*, as upon trial it effervesced slowly with vinegar: and as summer-fallows are fashionable, were deeper ploughing to take place in winter, and part of the understratum of clay, or rather marly clay, thrown up, to be rendered friable by rain, frost, sun, and air, it might be sufficiently ameliorated, and incorporated with the old tilled and exhausted top-soil by the following Michaelmas for wheat; and if the first crop would not be equal

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\* “ The soil of the Vale, on the grey lias tract, is generally shallow, from four to six inches depth: if we plough deeper, we plough up a yellowish clay, which hardens into a brickbat. This should not be ploughed up, and is situate between the top, or fertile soil, and the solid substratum of limestone.”—*Mr. Gale*.

The same opinion prevails in Pembrokeshire. “ Almost the whole of Castle

equal to the average of the usual crops of that tract, there is a strong probability that it would repay with interest for some longer credit, in order to be further improved by more tillage, exposure, &c. At least, deeper ploughing, wherever the top soil is shallow, and upon marly clay, merits a trial; especially where there is a depth of clay; otherwise, if it be very thin, deeper ploughing might be injurious, by opening a more rapid filtration of rain-water into the limestone crevices beneath; and the surface thereby becoming more thirsty in dry weather than it is at present.

The coal tract soil, in many places, consists of a sandy and black carbonic earth, upon a substratum of arenaceous clay. Ploughing deep is considered an improvement, though it will not be immediately apparent. The clay must be frequently ploughed, &c. to be pulverized and intimately mixed with the top soil. The hastening of this intermixture and pulverization, depends upon the farmer's good management.

In average soils, exhausted by tillage, an alternation of deep and shallow ploughing may be of service: *ex. gr.* Let land usually ploughed five inches deep, be winter-fallowed to the depth of seven inches or more; then return, for a few rotations, to the five-inch depth; then the worn-out soil, turned undermost would be worth the bringing up again for a few other rotations. Theory and perhaps practice may militate against this,

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Castle Martin hundred, is either a fine loam of considerable depth on limestone; or a red earth upon an argillaceous sandstone; or a combination of both, for a considerable distance on the confines of each. The substratum which divides the rock from the soil, is a brick earth, which the farmer is generally cautious to avoid, presuming it forms a kind of pan, which retains for a length of time the effect of his industry."—*Mr. Haasall.*

by

by supposing that too great a consumption for manure would be opened by such occasional deep ploughings. It may be owned that some additional manure would be necessary; but it would be abundantly paid for; the roots of the plants would be enabled to draw nourishment more copiously, from a greater extent: in wet seasons, the staple would have a greater capacity to dispose of superfluous surface moisture, and to retain it as a body of reserve, which would be found serviceable in a reverse season of drought.

The construction of the Dimetian ploughs; their inefficient ploughing in general; their splitting the autumn-furrow for barley in April, &c. has been already noticed: in that tract, however, they distinguish between the depth of furrow in ploughing for wheat, and that for barley. Near St. Clare's, our informant told us—"We plough only three or four inches deep for barley, and from five to six inches for wheat and oats: the English who come among us, plough from six to eight inches deep for barley."

*Cross-Ploughing*—is an operation in tillage, not frequently practised in the three western counties as others would imagine necessary. To plough the first furrow in autumn, and the second, and sometimes the third furrow in spring, always in the same direction, without ever ploughing across, for barley, may suit light, sandy, or gravelly loams; but whence the custom originated, or why it should still be persevered in, especially in the strong soils below Caermarthen, we are incapable of divining.

In some parts of the eastern counties, the second tillage of a ley fallow, as well as those on stubbles, is always performed by a cross-ploughing; sometimes at a right, other

other times at an oblique angle to the former furrow: by the latter angle, the coulter cuts the half rotten ley plits more readily than by ploughing directly across. This seems to be the old Roman method, recommended by Virgil (*rursus in obliquum verso perrumpit aratro, &c.*) and condemned in very strong terms by Jethro Tull; who says—"this is found not to attain the end of tillage near so well as turning the furrows back again into the same places where they were before breaking up; and not to plough across the furrows until the third ploughing. In cross-ploughing at the second tilth, not half the furrows are turned; they are only heaped one upon another, and the air keeps the grass alive for a long time; whilst that which is turned back the same way, without crossing, is all killed; and being dead on both sides, will grow no more; and the land is much sooner brought into tilth this way, than by cross-ploughing, as experience shews\*."

This method, recommended by Tull, of deferring cross-ploughing until the third tilth, has been the practice of farmers in Glamorganshire, and parts adjacent, time out of mind. When they break up *gwyndon* or *hendir* (old land) they generally lime profusely and immediately upon the first furrow; at the second ploughing (*eilar*) they plough in the same direction, turning back the plits; and at a proper season they commence cross-ploughing (*croes-arw*); after which the clods are in a fit state to be the more readily reduced by long-tined harrows, which intimately blend the lime and soil.

*Long-lacing* (*carreio*) was an ancient usage, and still sometimes practised, in the Vale of Glamorgan, &c. Early in spring, stripes or laces of about eight furrows

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\* Horse-hoeing Husbandry, p. 43, second edition.

wide were ploughed in somewhat recent pastures, ~~while~~ spaces of from eight to twelve feet wide left unploughed between the stripes. On the stripes, lime, in the proportion of about 200 bushels to every acre in the field, was carried, spread in clods, and covered with mould. When the lime had well slaked, the stripes were again ploughed, so as to mix the compost well. It was then spread over the unploughed parts, leaving a proportionate quantity on the stripes. Sometimes, but rarely, barley was sowed on the stripes; and if rain occurred soon after the spreading of the compost, the grass would grow luxuriantly on the unploughed parts, and produce good crops of hay. More commonly the stripes remained in fallow, and the green lacings were grazed, and both were sowed with wheat in October: if barley had been grown on the stripes, a sprinkling of dung was added in October; otherwise not.

“A farmer in Gower, some years ago, practised long-lacing with half-fallow-lime for every crop of wheat, and what dung could be procured for every crop of barley; and thus he obtained alternately good crops of wheat and barley for twenty years or more. Instead of long-lacing he would some years collect road-rakings and ditch-side parings to be mixed with lime, and dress for wheat. The two fields that had been so managed, are now the best pieces of pasture on the farm, and of any in the country.”

The utility of this long-lacing, as it is called, appears to us very problematical; besides its disfiguring the surface of a field, in what can it be superior to a general fallow? It is in fact inferior to a practice very common in Glamorgan, as well as other parts, of liming headlands profusely, and by repeated ploughings and harrowings, reducing the same to a homogeneous



neous compost, to be spread over the pasture field, to be grazed or mowed for one year, and the following year to be sowed with wheat. Instances of the most luxuriant and profitable crops of wheat might be adduced after this management in the Vale of Miskin and other places, where the soil is naturally fertile; and even in less fertile soils, making headland composts, where convenient, is the most beneficial method of bestowing lime. The Gower farmer, it is presumed, improved his two fields more by his composts of lime and "road-rakings" than by his "long-lacing composts." Long-lacing, however, is said to be again coming into practice.

*Breadth of Ridges.*—In the eastern counties, wheat butts on clover and other leys, are generally of five or six bouts, with furrow cleanings in the reans upon moist lands. The harrows work the sides first, and lastly the crown of the ridge. For the following crop, whether of barley or turnips, either two ridges are collected into one, or three ridges are split into two.

In wheat fallows sown under furrow, the ridges are generally narrow upon all kinds of soils: in Glamorgan and its adjacent tracts, they are of two, or at the utmost of three bouts wide. The Silurian, or old long plough improved, is here a favourite implement for this work; and it must be allowed, that it is very neatly performed. On good soils, the surface of the standing crop, in ear, is as uniformly level, as if the field had been ploughed with a Sussex turn-wrest. These narrow and raised ridges, deal out very exactly and minutely, the division of labour in reaping; and are absolutely necessary in lands liable to be damaged by superabundant wetness in winter or spring.



spring. The farmers are moreover persuaded that they gain an extension of surface by them. This is denied by such of them as have heard of Euclid; they demonstrate by figures, that the curved line forming the surface of the raised ridge, cannot admit any more plants or blades than could be raised on its flat base; and consequently there cannot be any thing gained in crop by the raised ridges. In shallow soils this is true; for the reans, made in the formation of the ridges, would be comparatively barren: but in good soils it must be owned, that there is some, though very inconsiderable extension of surface gained; for, by dividing a flat base of any given length, into very minute equal parts, it will be found that the arch, of which the flat base is the chord, will contain a greater number of those minute equal parts; otherwise a chord and its arch would be parallel lines.

Farmers argue further, that whether curved ridges can contain or rear any greater number of plants than their respective subjacent bases or not, yet they are persuaded curved ridges can rear their plants more vigorously, by affording nourishment to their roots at various depths; which, in a flat surface, would be all confined to the food afforded in one and the same degree of depth: the roots of plants growing on the sides or declivities of ridges, find room and nourishment under those growing higher up on the ridges; so that ridges, for this reason, can admit thicker crops than ground laid even, as the plants may grow closer together, and have sufficient nourishment and room for their roots. There is an obvious plausibility in this idea, and apparently a degree of truth, sufficient to obviate the objections generally urged against a supposed waste of ground in the reans. All is not igno-  
ran

ance in the reasonings of common and even illiterate farmers, whatever may be asserted of them by the undid superciliousness of agricultural authorship.

In the western exposures of Pembrokeshire, &c. ridges are generally laid north and south; this, it is said, affords shelter for corn in winter, that always secures a full crop on half or more of the land, whatever may be on the exposed sides of the ridges. The wheat in the reans, early in spring, is more forward than that on the ridges; and in common seasons the corn will be of equal growth and strength all over the field. This maxim prevails all over South Wales, where declivities, and other circumstances of exposure surface, or drainage, either admit or require.

I form my wheat ridges, sown under furrow, upon a fallow of three bouts, done with three teams following each other; a bout each team completes the ridge. The reans are made as narrow and as clean as possible, though a current of air between the ridges, might preserve a heavy crop from lodging. My ridges, as well as those of others west of Ogmore, on clover leys, are from ten to fifteen yards wide, which is advantageous for good ploughing. In the Vale of Glamorgan, east of Ogmore, their ridges are narrow on leys as well as fallows, and consequently many of them are very imperfectly ploughed."—*R. Thomas, Esq.*

*Ploughing-teams* are considered as more appropriate to the subject of this Section, than to that of the Chapter on *Live Stock*.

Teams of from three to five *horses*, drawn singly, are common in the counties of Radnor, Brecon, and Glamorgan. So are oxen in yokes, from two to four



pair in a team, more generally three, sometimes with a horse-leader, sometimes not.

"In Brecknockshire, they are much inclined to work oxen in preference to horses; but their great distance from lime and coal, compels them to keep one horse-team at least upon each farm. The general rule is to have one-third of the number of teams of horses, and the other two-thirds oxen. The small farmer, however, who has only one team, must have that a horse one. They work the oxen yoked, and the parochial roads especially are so narrow, and cut up by the waggon-wheels always traversing the same track, that no road-work can be done by yoked cattle."—*Mr. Clark, Orig. Rep. p. 23, 24.*

"In Glamorganshire, oxen in yokes are more used than horses, though I use them (as well as many others) both double in yokes, and single in collars; and horse both single and double, as they do best on roads too hard for the oxen without being shod. Oxen are cheaper kept, but both kinds of teams are useful upon a large farm."—*J. Franklin, Esq.*

"I generally work 24 oxen, in yokes: after bark-seedness I turn the twelve elder oxen to grass, house them the latter end of November, sooner or later, according to the season; having the preceding Michaelmas yoked twelve of my steers in their stead, and so on annually and systematically. I also work ten or twelve horses, both in length, and with a whip-rein, a-breast. I have no predilection for either kind of teams, they are both useful, and both necessary upon an extensive farm; a choice of either depends on circumstances."—*Thomas, Esq. Eglwys Nynydd.*

"In Radnorshire, the general proportion is to

ox-teams to one horse-team. They are sensible of the advantage of working oxen, but the distance from lime and coals, compels them to keep at least one horse-team on each farm."—*Mr. Clarke*, p. 21, in the year 1794.

"There are but very few oxen worked in Radnor Upper."—*W. Evans, Esq.* 1802.

"Our teams (in Radnor Lower) are chiefly composed of horses, and but seldom of oxen. We are, indeed, obliged to keep horses for road labour, and they are best for all purposes. We have good breeds, both of the cart and hack kinds."—*Mr. Weyman*, 1805.

"Great many useful horses are reared in Radnorshire, both for the saddle and the team. The breed of horses has been much improved of late years, and seem mostly, if not altogether, to have superseded the use of oxen in husbandry; horses being found to be more useful for all purposes, and a ready sale being met with for oxen as soon as they are of any size."—*T. F. Lewis, Esq.* 1812.

Antiquaries are divided respecting the boundaries of the Silurian and Dimetian tribes of Britons anciently inhabiting the present South Wales. These tribes still distinguish themselves without the aid of antiquarian lore; they are still distinct in some traits of manners and character; they have different dialects; different tastes in diet; they cultivate different plants in their gardens; and among other distinctions, they have different kinds of teams. The Silurian teams of horses drawn in length, of entire teams of oxen in yokes, have been already noticed. The Dimetian teams of the three western counties of Cardigan, Pembroke, and Caermarthen, consist most commonly of

two oxen yoked to a pole or beam, led by two horses a-breast. It is to be understood, that we now treat of general and long established customs, without noticing casual or modern introductions; for a few horse-teams, drawn singly or doubly, or oxen alone in yokes or harness, adopted by a few improvers in West Wales; or two horses a-breast before two oxen or cows, among the mountaineers of the three eastern counties; do not overthrow our main badge of distinction between the teams of the present race of Silurians and Dimetians in general\*.

The oxen, the Pembrokeshire especially, are equally active as the horses, and follow them, let their pace be what it may, trot or gallop. "The expedition these teams use in conveying coal or culm to the ships at Sander's-foot, and similar places, which must always be loaded during one tide, never fails to strike, with equal wonder and compassion, a bye-stander not used to such rapid driving as is always exhibited upon those occasions."—*Mr. Hassall, Pemb. p. 19.*

It is true, that a by-stander may be struck both with wonder and compassion at such exhibitions; but a stranger getting entangled among them on the sands, will feel some still more unpleasant sensations, as the

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\* George Owen, in his MS. History of Pembrokeshire, herein frequently quoted, distinguishes these Dimetian and Silurian teams by the terms *Welsh* and *English*: his words are, "the Welshmen plowe commonly with oxen and two horses before them. Among the English, divers have plowes of horses alone, but commonly six beastes in their plowe." This was in the reign of Elizabeth, about three score years, as the author says, "after the abolition of gavel-kinde."

The Bishops of St. David's, during the zenith of their territorial possession, had employ for thirty-two teams, of eight oxen each.—*Stat. Eccles. Men. in Mr. Fenton's Pembrokeshire.*



writer of this article can testify, from experience bought at Sander's-foot: and it seems from Mr. Malkin's alarming description of the Pembrokeshire teams, (Vol. II. 242, 8vo.) that he had himself fallen into the same dilemma. The general seat of the carter is, like that of a chaise-driver, in front of the carriage, standing on the wings of the pole: from thence, Jehu-like, he manages his whip, and sometimes his reins, and off he goes, to the terror of all strangers who meet him. The driver's apology for being always mounted is, that the oxen will not work so freely otherwise; in that case, Flemish ingenuity should contrive a curricule to be fixed on the plough-beam in the field. We are habituated to see mail-coach and hackney horses driven unfeelingly to death's door; but our compassion is more poignantly affected in seeing oxen harassed under such cruel treatment.

The Devonshire oxen are in high repute for their agility; but were we in the least given to gambling, we would not hesitate to say—that in a chariot-race, drawn by oxen, *Pembrokeshire against all England for a thousand guineas!*

“ In short distances, and for all work to be done upon a farm, the ox is certainly an useful and profitable servant. He is maintained at less than half the expense of the horse; and when his labours are no longer required, he pays the owner double the original cost. Notwithstanding the seeming advantages of ox labour, I have strong doubts of their utility, in the general way of working them in this county (Pembroke). In all business which unites hard and constant labour with dispatch, I am rather confident the horse-team is preferable; such as the regular round ac-



tive work upon a tillage farm, and all carriages upon hard roads, or for considerable distances. In such works I hope to see prejudices giving way to better judgment, and that our farmers will increase the size and bone of the breed of draught-horses, and apply them more generally to the purposes alluded to. It is painful to see oxen driven beyond what their strength can bear, and in a manner the wise Author of Nature never designed them for."—*Mr. Hassall, Orig. Rep. of Pembroke*, p. 19, 20.

## SECT. II.—FALLOWING.

LAND receiving more than one tilth or ploughing for one crop, is called a *fallow*, in which lax sense, as it admits of great latitude, there must be several varieties. The Welsh term for fallow is *braenar*, from *braen*, rottenness; and *ar*, surface; *q. d.* rotten sward, or rather surface, reduced tilth, &c. The varieties are the following:

### 1. With respect to the season or time of fallowing.

1. *Braener haf*, summer-fallow.

2. *Braenar mihangel*, autumn-fallow; this is also called Welsh-fallow, and *braenar-brwd*, or hot-fallow, from the quantity of lime bestowed upon it in Glamorganshire. More of this when we descend to particulars.

3. *Braenar gaeaf*, winter-fallow.

4. *Braenar gwyl fair*, and *braenar gwanwyn*, spring-fallow.

### 2. With respect to the succeeding crop.

5, 6, 7. *Braenar gwenith*, *haid*, *erfen*, &c. wheat, barley, turnip, &c. fallow.

3. With

## 3. With respect to the manure bestowed.

8. *Braenar calch*, limed fallow.9. *Braenar tail*, *Braenar tom*, &c. dunged fallow.

10. *Braenar marl*, marled fallow. True marl is not always strictly understood here, as that fossil is commonly bestowed upon grass land not to be ploughed that season; but this marled fallow is also called *Braenar trwsiad*, from its being *dressed* with composts, and in some instances with virgin mould.

11. *Braenar golosg*, pared and burned, or more strictly, charred fallow.

12. *Braenar brith*, a partially pared, burned fallow.

13. *Braenar llosg a chalch*, a fallow with lime added to the charred sod.

14. *Braenar tywod a gwymmon*, sea-sand and seaweed fallow.

*Pembrokeshire and Cardiganshire.*

## 4. With respect to no manure being bestowed.

15. *Braenar haul a gwynt*, sun and wind fallow, a provincial term, in Glamorganshire, for a fallow without manure.

“On the strong rich soil of the blue, or flag lias tract, this *Braenar haul* has produced from 20 to 27 bushels, and sometimes more of wheat, per acre; and a second crop from 30 to 36 bushels; after that, as many of oats; then beans; then wheat, barley, and oats; then lay down in natural grass, for as many years as crops. This is *sun and wind* fallow; and proves the goodness of the soil more than the goodness of the farmer's management.”—*E. W.*

## 5. With respect to the number of tilths.

16. *Braenar deuar*, fallow of two tilths.17. *Braenar triar*, fallow of three tilths, &c.

No. 1, by its name, proves that the soil during the summer produces no useful crop. Its treatment, the kinds and quantities of manures bestowed, are very various. It is practised in each of the six counties, but in none more general than in those of Brecknock and Glamorgan.

The writer of this article has a kind of infatuation for ascending the summits of the highest hills; not only with a mineralogical view, but also to have the gratification of observing the map of nature itself within the most extensive outline possible. At a proper season of the year, it throws some light also upon the subject of the present Section, as to the aggregate amount of land under fallow, within a given tract. From Clay-row-hill, in Radnorshire, he once numbered 50 fallows, of from 4 to 12 acres each, on the opposite red sandstone tract of Brecknockshire, from the Hay westward and southward. From Banuwchdenni, the Brecknock Van, or Beacon, he had a gratifying view of the adjacent Vale of Usk, with its appendages, the vallies descending from the Eppynt Hills. The fallows in view were exceedingly numerous, all minutely specked with small heaps of lime. This added variety to the scene; but it would have been more gratifying, had the so numerous ruddy, ermined fields, been clothed with the green of turnips, or of other luxuriant and smothering crops. These Brecknockshire fallows do their managers credit in one respect, however, that is, in being commonly clean; though it must be owned that fallows are much easier reduced and cleaned in the free-working, and in some instances, arid loams of the coasts of the Usk, than in the more humid climature, and more grass-producing soils of the more western counties.

“ If ploughing the ground three or four inches deep,  
and

and suffering it to remain all the summer, full of couch-grass, and other noxious weeds, can be called fallowing — *we have fallows* \*.”

Notwithstanding the attachment of the farmers of the old school to summer-fallows, some trials have been made of late to introduce the alternate green crop system into this county; by landlords prohibiting their tenants, by their leases, to take two white crops in succession. As examples are always considered superior to precepts, these also are not wanting.

“ I never have a naked fallow, nor two straw crops in succession, excepting there was a winter green crop fed off. The drilling husbandry I recommend, and fallow, whenever I can; but building, &c. at present interfere.”—*Sir Edward Hamilton.*

Farmers who think fallows *necessary*, think also that it is *as necessary* to render those fallows clean, by ploughing, harrowing, and liming; and *that*, at the season of vegetation, when weeds, root and branch, are easiest destroyed. This season opportunely happens between barley seedness and hay harvest; for the turnip husbandry too seldom interferes with the operations of summer-fallowing. In all cases, the fallowist must own that his fallow has been neglected, if not perfectly clean by the latter end of July; or at farthest before the commencement of corn harvest. This is more especially necessary upon soils of open texture, that they may consolidate again, so as to plough up in a more compact state at the seed furrow. A farmer having a light soil fallow, ridded of furze and fern, got it sufficiently reduced in June, and during dry weather soiled his young horses thereon, from an adjoining

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\* Thomas Lloyd, Esq. in the Original Report of Cardigan, p. 11.



# FALLOWING.

of vetches; continually changing the place of  
ing. By September, the fallow ploughed up,  
farmer expressed it in Welsh, *fel a fu'r eiddon*,  
like ox liver; and the crop of wheat the following  
year, was far superior to the average crops on such  
soils, that seldom bear good wheat crops excepting on  
over leys after one autumn ploughing.

The propriety, and even necessity, of getting summer-  
allows clean early in summer, is a prevalent opinion  
in most places; in the mountains of Glamorganshire,  
and in some parts of the Vale; upon the coal and the  
gravely loam tracts: but upon the lias limestone tract,  
especially, a mode of summer-fallowing for wheat pre-  
vails, which, when first observed by the writer of this  
article, drew from him some reflections that were not  
well received by the abettors of the system. He could  
not, without enquiring into the cause, approve of sum-  
mer-fallows appearing in full blossom in July, and even  
in August and September, like uncultivated botanic  
gardens; neither could he readily consider fallows  
answering their primary intention, if they afforded, dur-  
ing any part of the summer, after being once ploughed,  
any intruding crop that might tempt the farmer to turn  
in his grazing stock of sheep, and even full grown oxen.  
These, and other reflections, drew from his friend, Mr.  
E. W., the following sharp remonstrance, in defence  
of the prevailing practice.

"The practice of every country is founded on cir-  
cumstances and reasons peculiar to that country; and  
the transient glance of a traveller passing through any  
such country, can never perceive them: they can never  
be known but to a native, or one that has resided for  
some length of time there. There are bad ploughmen  
in Glamorgan, as elsewhere; and such instances as are  
above

above given, may have occurred: but in general, the Glamorgan fallows are well ploughed; and are the cleanest that are any where to be found. Wheat on fallow never requires weeding, and weeds do not abound in the soil. Thistles are almost the only weeds known; which, after the first ploughing of a fallow, in March, April, or May, are suffered to grow up until coming into blossom in June: they are then mown; and to kill them in their venom, *i eu hafladd yn eu gwenwyn*, as the Welsh phrase it, lime is carried hot from the kiln on the spot, and spread over the field. The causticity of the lime effectually kills the thistles, and other weeds; and more certainly than if the weeds had been sooner mown, or the land sooner ploughed. The couch-grasses are effectually destroyed by lime. No fallows in the world are cleaner than those of Glamorgan; nor is the fallowing system any where better, if as well, understood."

To avoid litigation with such a potent adversary, no other rejoinder will be given, than *lime away*: however, if lime be the *sine qua non* of fallowing, let its effect be visible, and the fallows clear of weeds earlier in the fallowing season than the 19th of October; on which day, 1811, thistles and other weeds were seen in triumphant and full possession of several extensive fallows on the *lias* limestone tract: and let the fallowists of limeless tracts trust more to the timely operation of the plough and the harrow, than to that of the small quantity of lime which they do or can bestow; as it is not above one-sixth or one-eighth part of the quantity frequently bestowed upon an acre in this heavy liming part of Glamorganshire; which will be further treated in the subsequent Section on *Manuring*.

## 2. Autumn



2. *Autumn Fallow*.—This is called *Welsh-fallow*, as it is the practice of the country from ancient times; an entire *summer-fallow*, according to tradition, being a more modern practice introduced from England. It is also called *Braenar brwd*, or *hot fallow*, in Glamorgan; as some think, from the quantity bestowed upon it of caustic lime; but as that quantity is commonly not above one-half of what is given to a summer-fallow, the term *hot* is not properly applicable: it may therefore be so called, figuratively, from the hurry in which it is performed between corn harvest and wheat seedness. “In the latter end of harvest, spread lime, hot from the kiln, on brush, stubble, or ley; plough four or five inches deep; cross-plough in a week or two, harrow, and if the weather be favourable, rake the couch and burn it; then sow wheat. After this treatment, the crop, of all others, is more likely to be winter proud; therefore late sowing is best.”

In other parts, the brush, or stubble, is immediately ploughed after the crop is off; lime is spread from a large heap in the field, carried during summer; it is soon after harrowed; and muck is generally added, ploughed in, in ridges of five or six bouts, and wheat sown on the furrow, and harrowed. This practice, however, is now becoming more and more reprobated among the farmers themselves. A person doing it, is not looked upon by his neighbours as a good farmer. In enquiring how A or B goes on in farming, the answer, in such cases, generally is—“O! not very well; he is too much given to *brushing*,” i. e. to sow wheat immediately on the fallowed stubble of a preceding winter crop. Wheat on one furrow of a clean pea-brush (*rara avis*) is an approved practice; but it does not come under the denomination of a fallow.

In the Dimetian or Western counties, *autumn* fallow, on ley or old pasture, for barley in the following spring, commonly commences the rotation :

“ If wheat is the first crop, it is preceded by a fallow. When they do not fallow for wheat, they begin in the summer to carry lime, and lay it in small heaps upon a ley field: in autumn they carry dung, and spread it over the field with the lime, and, thus incorporated, the field is ploughed; and in that state remains until the spring of the year. It is then harrowed, and if the soil be light, the seed is sowed under furrow: if the soil be strong, an additional ploughing is given, but it is never cross-ploughed\*.”

The same Dimetian custom of not *cross-ploughing* such barley fallows on ley, extends through parts of the other two counties of Caermarthen and Pembroke. When they fallow for wheat on light soils, it is not thought necessary to break the ground early, as they sometimes take a crop of hay first, and then fallow.

3. *Winter Fallow*.—This is chiefly a preparation for an ensuing summer-fallow, and is very properly practised on coarse strong soils when first brought under tillage; and at a season when labour is cheapest, and the furrow most pliant: this term also comprises the preparation of wheat stubbles for spring crops.

“ My ploughings are very deep, and we endeavour to finish the first before Christmas on all the stubbles. It is too common a practice with farmers to let their stubbles remain unploughed until spring, for the sake of keeping a few wild and unprofitable sheep upon them; which is ruinous to both landlord and tenant; ploughing

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\* Original Report of Cardiganshire, p. 11.



and harrowing being so deferred to as late a period as possible, must be done all at once, and through all kinds of weather."—*Sir E. Hamilton.*

"Their cattle, in the spring especially, after a whole winter's starvation, are very weak; and they never think of ploughing in winter."—*Mr. Clark, in Brecon Upper, p. 36.*

#### *On the Necessity and Non-necessity of Fallowing.*

This dispute, between what is commonly called the old and new schools, is now of considerable standing and, like many other campaigns, it does not appear to be drawing to a close. Paper-war of all others is the most endless. Neither Boyle nor Bentley will readily give up the contest. Landlords form opinions;—Lawyers write them down in leases;—but farmers very slowly reduce them to practice; and the reason of it is because they are not *convinced* of their utility. A class of farmers of the new school, already described, have endeavoured to convince them by examples; but they too frequently retire from the field, before that conviction is to any considerable degree effected. This hasty retiring is considered by the farmers of the old school as a decisive proof that the dogmas of the new system are all Utopian dreams, vanishing as soon as the abettor of them has the benefit of rational faculties.

What then can be done towards opening the eyes of those who are considered as *blind*; yea, as *boobies*, by a polite writer in Mr. Young's *Annals of Agriculture*? There are agricultural apprenticeships served both on the north and on the south of the Tweed. Would it not be advisable for patriotic land-owners in Wales to encourage such education of the most eligible of their tenants

tenants' sons; to take them in succession as their own farm-bailiffs; to furnish them with rational theories, to be by them reduced into practice? These tutored young farmers would gradually disseminate the approved doctrine of agriculture far and wide through the country; and that in a language intelligible to the illiterate, and convincing to those who were theretofore considered as obstinate.

A patriotic land proprietor, brought what were considered as enlightened farmers from Scotland into South Wales; fishermen from Holland and America have been naturalized; and the migration of a colony of Grisons from the frozen regions of the Alps, to teach industry and cottage economy to our own mountaineers, has been in contemplation; but as Mr. Hassall very judiciously observes, "New practices in husbandry will be most likely to succeed through the medium of the *natives of the country*. They have an unconquerable dislike to every thing introduced by strangers; and not without some reason, as most of the people who have come into this country from the English counties, and commenced farmers, were in bad circumstances at the outset, and therefore have not succeeded in their undertakings; and the natives, eager to reprobate any thing new, readily attributed their failure to defective practice, rather than to the real cause—*want of capital*."

This observation will be found to be generally true in every country. Few persons in good circumstances, can be tempted to migrate; whilst others of a different description, are frequently under the necessity of doing it; and, generally, it can only tend to

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\* Original Report of Pembrokeshire, p. 63.

## FALLOWING.

... local failure. Then the teaching of the  
... as recommended above, would have a much  
... effect in establishing the doctrines of the new  
... school, than the introduction of any strangers into the  
country.

One "Landlord's Advice to his Tenants" has been  
already published, both in English and Welsh; were  
more Welsh treatises on agriculture printed and dis-  
persed, from the general inclination of the Welsh to  
imbibe information by reading, they would be read  
with avidity. Useless novels, and Tales of a Tub,  
are frivolities as little known, as cherished in modern  
Wales. This establishes a belief, in early youth, that  
every thing committed to the press has the *imprimatur*  
of truth. Amongst the first agricultural treatises in  
Welsh, should be one on the *non-necessity of fal-*  
*lowing*, excepting in rare and particular instances,  
when woodland, ferny or furzy soils of wastes, &c.  
are first to be cleared and brought under tillage. Sum-  
mer-fallowing in such cases is admissible, if not indis-  
pensable; but in the middle of a rotation or course of  
crops, or commencing one on land that had been tilled  
before, it cannot in sound reason be considered as ab-  
solutely necessary. Does the soil *want rest*? the most  
untenable, and the least resorted to, of all arguments in  
favour of fallowing. The farmer may be told that  
soil, like animals in summer, *rest* better in the shade  
than in the sun. Does the soil *want cleaning* from  
weeds? It most commonly does, under a harassing  
system of tillage; but there are other means than fal-  
lowing, nearly if not equally efficacious, and much  
more profitable.

A farmer is frequently short of hay in a cold and  
late spring, and the reason of it is, he had no winter



green crops to save his dry fodder in time. He knows the proverb, "*Yngenau'r sach, mae eiriach y blawd*;" i. e. at the mouth of the sack, spare the oatmeal; so it is in winter-feeding stock. But the farmer may say, "I have so many acres of meadow land, and I do not overstock my farm;" but desist from your practice of summer-fallowing, raise green crops of turnips, cabbages, vetches, clovers, &c. and you will be enabled to double your stock, and have it in much superior condition by the spring markets. This increase of stock, it is plain, will bring increase of profit. The value of every winter green crop is a clear gain in itself, exclusive of its production of additional and better manure, either on the field or in the yard. Chemical agriculture may be called in to ascertain the generation or combination of particular airs, or other substances, under the close cover of green crops during summer and autumnal heats, and alternate nightly damps; which, whatever they may be composed of, or however combined, are found by experience to produce a fertility not exhibited by similar soils under opposite management.

### SECT. III.—COURSES OF CROPS.

HOWEVER tillage may be well conducted in its several departments of ploughing, harrowing, and manuring, yet, if a proper course of cropping be not attended to, their good effects cannot be in any degree permanent. By a proper course is meant, not so much the alternation of varieties of species of white or straw crops, as the proper limitation of their continuance,



be the species whatever they may, if suited to the soil and climature, and the call of the home markets.

The courses or rotations of crops within the district, may be divided into three classes, the aristocratic, the democratic, and the miscellaneous; the *first*, not in point of time or of *general* popularity, but of supposed scientific and superior excellence, is the aristocratic or Flemish course of alternate green and white crops, including all legumes among the former. This is called, by way of eminence, the *new system*; and its abettors, in every part of the district, are chiefly persons of property, farming their own demesnes, and having adopted themselves the favourite course, recommend it also to others, and many of them insist upon their tenants following their example. The arguments in favour of the new system, generally the same all over the kingdom, let the soil or climature be ever so different, are so well known, that they need not be here repeated. The course claiming the most rigid adherence to system, is that improperly called *the Norfolk*, of, 1. Turnips with dung; 2. Barley = 3. Clover, limed between the two summer crops = 4 Wheat on one furrow without further manure, then fallow and dung for turnips again, &c. &c.

The above course is varied under certain circumstances, without violating the main principle of alternation of green and white crops; as for instance, on uplands, newly enclosed wastes, &c.; 1. Pare and burn, add lime to the ashes, and sow rye; 2. Turnips on dung; 3. Barley or oats, according to the state of soil and situation; 4. Clover and rye-grass; 5. Wheat, with dung compost and lime; 6. Potatoes, vetches, &c.; 7. Oats and grass-seeds.

*Other*

Other variations:—After turnips, barley, clover, wheat; then pease, oats, clover, wheat, turnips, barley, buckwheat, wheat, pease, barley, clover; or, 1. Turnips; 2. Spring wheat; 3. Pease; 4. Barley; 5. Clover; 6. Wheat; 7. Turnips; 8. Barley; 9. Pease or vetches, &c.

Mr. Vancouver, during his short residence at Llangennech Park, in the Caermarthenshire coal tract, and Caermarthen Bay to the south-west, thought the climate too humid to sow wheat after clover; he therefore adopted the five-shift course of, 1. Barley; 2. Clover; 3. Pease; 4. Wheat; 5. Turnips. Even his pea-brushes, though clean in July when the crops were cleared off, would frequently become too strong in grass before September, to be sown with wheat. In such cases, he would autumn-fallow, ridge-baulk in winter, clean the land in spring with cultivators, and sow barley.

The *second* class of courses is the democratic, or old system of taking three or four corn crops in succession, giving adequate quantities of manure with such of them as stand most in need of it, and then laying down in grass for as many years as crops taken. This is as regular an alternation of crops, as the modern and approved Flemish course; the difference is in the length of time between the alternations. The new system substitutes a green for a white crop every alternate year; the old system every three, four, five, or even six years; the new system exposes the bare soil, during preparatory tillage, for a part of the year, annually, so does the old system during the years of tillage; but when laid down, the land is under the cover of sward for an equal number of years, imbibing the gifts of nature from the air, and receiving the auxiliary aids of art,

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and when the season of rest is expired, it is found prepared to undergo again the same course, with recovered vigour. The green crops of the new system are annuals; those of the old system are perennials, and more especially in the humid climates of the three western counties, where land is frequently laid down to rest for years in natural grass.

Till of recent times, the corn culture of South Wales was on a small scale, just as much as supplied its little home markets. No great works, with their attendant great markets, had yet appeared in the country. The iron works were not opened; the tin and copper works were not established; the collieries were but on a very diminutive scale, for mere home supply; there were no great demands for corn from Bristol, or any other great English market. The chief business of farming with most, and the whole with many, was dairying and rearing of stock, and tillage was carried on by most with a view to the improvement of pastures, more than to any great advantages or profits that could be derived from corn. With such views, no grass lands were ever broken up without such quantities and qualities of manure in readiness, as would be adequate to the purpose of improving as much as possible its future pasture. On the limestone and several other tracts, leys when broken up, gave good crops of wheat on one ploughing, on inferior soils, oats; the second crop on the best soils, was frequently wheat again, on a Welsh or autumn fallow; the third, barley on a good quantity of manure, then the land to be laid down in natural grass. Thus with three crops, two good manurings were given; to take more crops was considered as greatly abusing the land. After the three crops, the ground was to remain in grass for a  
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least five or six years, and other pieces, from having become hide-bound or mossy, wanting to be refreshed, as it was termed, were broken up, and subjected to a similar course. There were other courses, such as the following :

1. On strong soils—" Beans and wheat alternately for six years, and lay down for as many years. Some sowed barley and clover to lay down for the seventh crop."

Another—1. Beans on ley ; 2. Wheat on fallow ; 3. Barley on winter-fallow, with manure ; 4. Oats, and lay down in natural grass.

On loams less strong—1. Wheat on ley, sward dressed with lime alone, or lime and earth compost, in the May preceding ; 2. Pease on dung manure ; 3. Wheat on autumn-fallow ; 4. Barley or oats on manure, and lay down five, six, or seven years.

On light soils—1. Wheat on sward-dressed ley ; 2. Barley or pease on manure ; 3. Oats ; 4. Winter-fallow, and manure for barley, and lay down.

On inferior soils—1. Oats on newly broken uplands ; 2. Wheat on autumn-fallow, or barley on winter-fallow ; 3. Oats or barley on a good manuring, and lay down for five, six, or seven years in natural grass.

On moory soils—1. Wheat, rye, or both mixed, on a pared and burned fallow, sometimes lime added ; 2. Barley or oats ; 3. Barley or oats on manure, with some lime, and lay down as above.

In high situations, instead of wheat, barley or oats were more generally the crops, and often needlessly so in better soils.

When times of greater demand for corn arrived, and second rounds of corn crops were taken, it became an established maxim to give lime with every

succeeding wheat crop, and dung with every succeeding barley or pea crop, and even sometimes with oats when last, and the land to be laid down.

Demands for corn still increasing, its prices advancing, and its culture becoming a source of much greater profit than heretofore to the farmer; violations of the old approved principles took place, till at length those principles were almost entirely abandoned, and to notice the ruinous practices that followed, would answer no useful purpose.

The popular courses that at present prevail in South Wales, are the following :

1. Courses commencing with *wheat on summer-fallows*.

1. Wheat on summer-fallow, manured with ten tons of rotten dung, and 50 bushels of lime per acre : seed 80 quarts per acre, sown under furrow, produce from 20 to 25 bushels per acre.

2. Turnips without manure, on a winter ploughed fallow; the larger carted off, and the smaller eaten on the field.

3. Barley on the third furrow; seed 120 quarts per acre; with red clover, 20 lb.; produce from 30 to 32 bushels per acre.

4. Clover grazed by sheep and pigs.

5. Wheat on the clover ley, "without manure, if the soil be good; if not, give a coating of dung; sow on the furrow, and harrow deep."

6. Turnips with lime and dung.

7. Barley; 8. Clover; 9. Wheat—Then fallow again.

This was found practised in Brecknockshire and Radnorshire, on the good soil of the Vale of Wye. It seems



seems to be the Flemish course adulterated with summer-fallows.

Adjoining the Vale of Usk, on land ruined by a long succession of oat crops, without proper respite and manure:

1. Wheat on summer-fallow, manured with 100 cart-loads of soil and 300 bushels of lime per acre: seed 20 gallons, and produce 28 bushels, customary measure of 40 quarts.

2. Turnips, with a good manuring of dung.

3. Barley, seed 30 gallons per acre, upon the second or third furrow.

4. White clover, sown immediately after the barley, harrowed with a thorned hurdle, seed 12lb. an acre: seed preserved, and sold to the amount of 13*l.* 6*s.* 8*d.* per acre.

5. Wheat on one furrow, seed as before. Red Lammas, dressed with urine and lime, changed every three or four years from the chalky counties in England.

Vale of Usk—1. Wheat upon a fallow; 2. Barley, or Pease; 3. Oats; 4. Turnips; 5. Barley; 6. Clover, two years; 7. Wheat; 8. Turnips.

Or—1. Wheat upon a fallow; 2. Barley; 3. Oats; 4. Pease; 5. Oats and clover.

In the Valley of Honddu, a mountainous ramification of the Vale of Usk; in the red sandstone tract:

1. Wheat on summer-fallow, after oats on old ley: fallowed first in autumn, if strong; if not, on dry weather in summer; limed with 75 bushels an acre, lime bestowed as early as possible, at least five or six weeks before seedness: harrowed in; then carry dung before the seed furrow: sow the seed, 20 gallons an acre upon the dung, and plough it in: "20 gallons is enough when the grain is dry, and runs well; otherwise 5 gal-

lons more seed is required." Liming is much lower in general, some do not lime at all: produce on land well managed, 25 bushels. Our informant had so the three last years; but in 1811, his produce was about one-fourth less; which is the general average of the Valley in the best years: some 12 bushels, and some still less.

2. Barley on winter-fallow; the earlier ploughed the better, the stubble to be well rotted, and the soil if strong to be ameliorated by frost; plough again in March, if the soil be strong and weedy; if not, harrow it across with a four-horse harrow of five bulls, and five tine in each of 2lb. weight, in all 100 lb. weight of tine, exclusive of iron couplings and wood; then plough and sow on the furrow; and let the harrow follow the plough, drawn by two horses—best abreast, but sometimes lengthwise; seed 30 gallons an acre; produce 30 bushels. Sometimes clover is sown with this crop; then wheat, with sometimes lime alone, sometimes dung alone, and sometimes, though rarely, both together. If clover be not sown with barley, then it is succeeded by 4. Oats and clover; oat-seed five bushels an acre; produce 25 bushels, more or less. White clover and rye-grass are added to the broad clover in laying down; the land is then left to rest for three years or more; when it undergoes the same course of oats; summer-fallow for wheat, &c.

Our informant (Powell Powell) is one of the most intelligent peasants we have met with; and we consider it as degrading to him, that he is doomed to keep a small inn at Capel Ucha. He manages a considerable farm, and we beg leave to recommend him to the notice of his landlord. Open his mind with instruction, and he is capable of any improvement in agriculture.

On the southern side of the Vale of Usk, under the *Van*; red soil tract:

1. Wheat on fallow, limed in June, with 30 barrels per *erw*, or nearly 75 bushels per acre; harrowed in immediately; dunged in August with short muck, and ploughed in; sowed in October under furrow, seed 30 gallons per *erw*, *i. e.* 20 gallons a statute acre: produce from 15 to 20 bushels.

2. Barley on the second or third furrow; seed one-sixth more than wheat; produce 35 bushels.

3. Pease, without manure generally, sometimes limed: seed one-sixth less than wheat; produce nearly the same as barley.

4. Barley or oats with clover: oat seed 6 bushels.

We found this course in Pembrokeshire, with no variation, saving that the pea crop was manured with dung; which is a practice condemned by a Builth farmer in Brecknockshire, who resolves in future not to dung pea crops, because it forces them to grow too lengthily to be productive: he will lime for pease, and reserve the dung for the following wheat crop.

Near Trecastle, in the elevated red sandstone tract:

1. Fallow, carry lime in June, lay it in small heaps; and as an improvement on the common practice, cover the heaps with soil the first day; turn the heaps the second day, and cover with fresh mould; the third day, turn, and cover again, to remain in that state till the latter end of August; then spread the whole, and plough light across the land; dung at Michaelmas, and sow 30 gallons of wheat per acre; if early, 25 gallons; produce more plentiful of straw than grain."

2. If the land be level, plough the wheat stubble in November; if on a declivity, defer ploughing till later, lest the winter rains should wash down the manure;



nure; cross-plough about the beginning of March; harrow in April, just before the last furrow; sow barley from 30 to 35 gallons per acre; produce from 9 to 19 bushels. Our informant reckons 12 or 13 bushels a fair crop; sometimes from 19 to 20 bushels, seldom more; many have not above nine.

3. Some sow pease, and then oats and clover: others more commonly sow oats after barley; seed five bushels per acre: some few sow clover with the oats, then wheat on clover-ley, but wheat succeeds much better on a fallow." Some fallow the oat-stubble without clover, for turnips, sown broadcast. "Penry Williams, Esq. of Penpont, drills his turnips; he once farmed very extensively; but he has now let as much as 700*l.* a year to one tenant."

On the grey soil, in the hilly ramifications of the Vale of Towy:

1. Wheat on fallow, manured with from 75 to 100 bushels of lime, laid in small heaps about Midsummer, to continue in that state till dung, a slight dressing, is brought before seed time, and both spread together. Seed, under furrow, about 20 gallons, produce about 20 bushels per acre.

2. Barley, the wheat-stubble ploughed before Christmas, ploughed the second time in March, harrowed, and sowed under the furrow, "which is deemed more certain of a crop in cold or frosty springs." Seed 30 gallons, produce 35 bushels.

3. Oats on one ploughing; seed 50 gallons nearly the same as that of barley.

4. Barley, with clover and other seeds; "sometimes the second and third crops are barley, and the latter crop frequently the best, as the first is too liable to lodge.

lodge. Some give a slight manuring with the second crop of barley."

In the Vale of Towy, about Llandagoc, Taliaris, Gallt y Gôg, &c. in the shale and slate tract:

1. Wheat on fallow limed, with from eight to ten teals, or from 40 to 50 bushels; seed 20 gallons if early, 25 gallons if late sown.

2. Barley; seed 30 gallons; 3. Barley; 4. Oats; 5. Oats; 6. Pease, with a little dung manure, "*i droi ei gefn*;" 7. Barley and clover. The farmer owned that it were better to omit the fifth crop of oats, "*Gwell peidio a hou ceirch y tro yna*," said he: *Gwell yn wir!*

Another—1. Wheat on fallow; 2. Barley; 3. Oats; 4. Barley and clover; 5. Clover one or two years; lime on the sward, and farm-yard manure at seedness in October; and 6. Wheat sown on the furrow, and harrowed in; then proceed as in the last course.

Another—1. Wheat upon fallow, or potatoe-ground, dunged, with from 40 to 80 teals of lime, *i. e.* from 200 to 400 Winchester bushels of lime: seed 3 bushels; average produce 21 bushels; some good crops 30 bushels. "Lime always spread quick; effete lime remains in the same state, until reduced by subsequent tillings.

2. Barley, on light and early soils, under furrow; seed 4 bushels; average produce 36, sometimes 40 bushels.

3. Oats on the second or third furrow; seed 5 bushels; produce less than that of barley.

4. Clover for one year; seed never under 20 lb. an acre, and from that to 24 lb.

5. Wheat on one furrow; the second crop of clover rotted, and ploughed in; with no other manure; produce inferior to that from a manured fallow.

6. Bar-



6. Barley, manured with lime alone.

7. Oats, with clover, and rye-grass on moist spots; when intended to remain for years in grass, white and hop-clovers, with cow-grass are added.

On good soils oats are now very commonly discontinued by many, as they produce straw too abundantly and grain the reverse. With such farmers the course is; 1. Wheat on fallow; 2. Barley; 3. Pease; 4. Wheat; 5. Barley with clover; 6. Clover for two years; and if the soil be considered "*in good heart*" lime the ley, and take, 7. Wheat, &c. but if the soil be "*crop worn*," it is left in grass for from four to six years. Pease, substituted for oats, are also complained of in Towy Vale, &c. owing to the wetness of the climature; they are incessantly growing, and are with difficulty harvested; and of course discontinued.

In the hundred of Kidwelly (*Cydweli*), in the Caermarthenshire coal-tract, &c.

1. Wheat on fallow; first ploughing in spring, limed with 40 bushels per acre, dung added; seed three bushels and a half, sometimes four, per acre; sown under furrow, most commonly with the long plough: average produce 16 bushels. The wheat crop is sometimes rolled in March or April.

2. Barley on the second furrow, and harrowed in; seed from four bushels and a half to five bushels: produce from 16 to 20 bushels per acre.

3. Oats on one ploughing, harrowed in: seed six bushels, produce from 20 to 24 bushels per acre.

4. Barley again, sometimes with a sprinkling of lime, or lime compost; with clover, rye-grass, and sometimes hop-clover mixed; clover, rye-grass frequently singly, but hop-clover never alone: but the more general practice is not to sow any seeds, leaving the  
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the ground to recover its sward naturally, for four or five years ; then the same round recommences.

In this tract we frequently found the too common course in most parts, of : 1. Wheat on half dressed fallow ; 2. Barley ; 3. Oats ; 4. Barley ; 5. Oats ; and not unfrequently 6. Oats ; all depending for their support on the fallow manure.

As a contrast to the foregoing common course of crops, and treatment of soil, in the coal-tract of Kidwelly, we insert the following practice, in our informant's own words :—" The climate is very moist about the autumnal equinox, in general ; but not so moist as represented by many, so as to prevent the culture of wheat. Sow early, before the rains set in, then you have a chance of reaping early : I do so, and few crops equal mine. I have had this year 32 bushels an acre, whilst the average crops of the country yield not above half that quantity. There is also a prejudice against the soil of the coal-tract ; but without any reason. The coal-tract soil will produce excellent corn, where dry ; and where wet, drain ; and then lime abundantly. The coal-tract water contains vitriolic acid, which poisons the land, and produces sour grasses (not palatable at all to any species of stock), lime neutralizes the acid, and so converts it into the food of plants. My usual course of crops is as follows :

" 1. Wheat on fallow, seed two bushels an acre, and I have had in return four quarters. I generally have it fed off in March and beginning of April for a month, with ewes and lambs, until it be rendered as bare as a fallow ; and I consider spring feeding of wheat as a good practice, on the principle of *thin sowing*.

*sowing.* The succeeding crop depends on the nature of the soil : on wet soils—

“ 2. Oats; seed three bushels and a half; produce five quarters per acre: on dry soils—

“ 2. Barley, on the second furrow; seed from two and a half to three bushels, with 15 pounds of clover when sown alone; or about eight pounds of clover with one bushel of rye-grass.

“ 3. On dry soils, sometimes the clover, &c. is omitted, and the barley is succeeded by pease, vetch, or some other green crop; which is, 4thly, followed by barley, with 10 pounds of red clover and five pounds of hop clover mixed, to rest for four or five years. Then repeat the course. Wet soil I generally lay down for good, ridged so as to get rid of surface water; drains having before disposed of the springs.

From St. Clare's to Whitland Abbey, excellent soil on the banks of the Tawe; grey soil, bordering on the red-tract:

1. Wheat on fallow, limed with three cart-loads of 14 bushels each per acre; with twice as much dung, if possible; if not, as much as can be had; lime the first tilth, dung on the third, seed on the fourth.

2. Barley; 3. Oats or pease; 4. Barley or oats, “ with or without grass-seeds, and left to rest four years, where the farmer is permitted to break up other land; but where that permission is not granted, fallow again as before; and so round and round, as long as the seed can be expected to be returned: the farmer and landlord complaining of each other; but which with the greatest justice, we presume not to determine.”

In Cardigan Lower, Valley of Teivy, &c.

“ 1. Wheat on fallow; if a good crop, wheat again,”



again, if not, 2. Barley; 3. Barley; 4. Barley; sometimes, 5. ditto, then a succession of oats, oats, for years."—*T. Lloyd, Esq. Original Report.*

Several other courses of the same kind might have been inserted; but as few of them are better than the foregoing, it can be of no use to record them: the sooner they are discontinued, and suffered to fall into merited oblivion, the better. The better courses of this tract, practised by the enlightened farmers, will be noticed in the succeeding classes, where the leading principle of this class, a summer-fallow, is not included.

Near Cardigan—1. Wheat on fallow, with lime and earth compost; 2. Barley; 3. Oats and clover. "In this case oats should not be sowed as early as usual, lest the clover should outgrow it, and injure it."

In Cardigan Upper, table land, with frequent undulations. "Soil easily kept clean, with proper management, harvest precarious, owing to vicinity to a western sea: summer-fallowing practised, when land gets weedy: then"—

1. Wheat on fallow, seed from two and a half to three bushels, pickled to prevent smut; always sown under furrow upon fallows, and rolled in spring: if forward in March, it is fed off with calves, sheep, &c. "feeding does not injure the crop." Manure on fallow, lime from eight to ten teals (40 to 50 bushels). The common quantity of lime is much less; most added before seedness. Wheat produce, sometimes from 17 to 24 bushels; average from 12 to 15 bushels per acre.

2. Barley on fallowed wheat stubble.

3. Oats and clover: some clover the second crop of Barley; rye-grass and ribwort are sown with the clover, and lay down for four or five years. Then break up again

again generally for oats, then potatoes and turnips on fallow; 3d, wheat, and proceed as before. Sometimes pease succeed oats in the second round, limed in spring on the plants, then the brush dunged at Michaelmas for wheat.

The most general course of all, among the common farmers, in most parts of the district, is that of wheat, barley, oats, and either laid down with seeds or not, or the same round is repeated, commencing with wheat on manured fallow, as before. Clovering with the third crop, viz. oats, is by many common farmers not thought to be running the land too long, as the oat crop is generally too foul for clover, therefore the clover with the second crop, viz. barley, the land being fresher, and the crop cleaner, owing to the superior tilth given to barley, and that later in the season.

In Glamorgan Upper, coal-tract soil, Gelli Gaer, &c.

1. Wheat on fallow, ploughed first in March, ploughed again in June, not crosswise, but turning the plit back, then dragged, and limed at the rate from 2 to 4½ dozen barrels or loads per cyfer (from 160 to 360 bushels per acre), seed three llestraid to an ewr (three bushels per acre), produce from fifteen to twenty-one bushels per acre.

2. Barley on wheat-stubble, fallowed in December, cross-ploughed in March, sowed in April. Seed same quantity as wheat, sometimes sown under furrow, produce from five to ten returns.

3. Oats on one furrow; seed the same as before, normally, or three bushels; but in most places, a customary bushel of oats equals two of wheat.

4. Barley, with seeds sometimes manured, but more commonly not.

Clover



Clover seed from Monmouthshire.

Another—1. Wheat on fallow; 2. Oats; 3. Barley on manure with clover, sometimes to rest; other times, 4. Clover; 5. Wheat; 6. Barley; 7. Oats and clover. Sometimes the sixth crop is wheat again upon a manured autumn fallow.

In the same, hills of Llanwynno, coal tract—“Mountain soil, by judicious tillage, may in half a century become equal to any in Britain, and superior to the (at present) much more fertile soils of the Vale district.

“Some of the mountain vales are peaty, from six inches to two or three feet deep, under which is an argillaceous subsoil; some mountain vales, as that of Aber-Dâr, and several others, have a sound dry soil, a strong loam of exuberant fertility, to the depth of six, eight, or ten feet, and are, in their own nature, fit for every purpose of agriculture; others, as the Vale of Taff, &c. are dry, light, and sandy, and produce excellent barley, clover, turnips, &c. and also wheat. These last require a strong dense manure.

“Fifty years ago, barley and oats were the common crops of these mountainous tracts; and he that would have made a trial of a crop of wheat, would have been deemed a madman. Now, wheat has, by experience, been found to succeed much better than barley. After good management, the produce of wheat will be from 28 to 36, and even 40 bushels per acre, in moderately good seasons. Barley from 30 to 40, and often more; and the second round not much, if any, inferior to the former.”—*E. Morgan, Esq.*

1. Wheat on fallow, manured with lime and peat compost.

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2. Bar-

2. Barley, with clover.
3. Clover, fed and mowed, or grazed the whole summer.
4. Wheat on the ley, with dung if it can be spared.
5. Oats, sometimes with clover alone, other times with rye-grass alone; but if neither, then fallow in May or June, and lime on the first fallow, cross-plough and harrow; give dung, if possible, with the lime.
6. Wheat, and proceed as above one round more, and lay down in good condition, from five to seven years; then again a round of tillage.

A full liming course, from lease contracts—"1. Wheat on fallow, limed with 50 cranocks (450 bushels) per acre; 2. Barley, with clover; 3. Clover; 4. Wheat on clover ley; 5. Barley; 6. Oats. Then summer-fallow again, 'and repeat the course,' said the farmer, 'to eternity, if I live so long.'"

Glamorgan, west of the river Ogmore, Pyle, &c.—  
1. Wheat on fallow, limed in June, and dunged in September.

2. Barley; 3. Oats; 4. Wheat, manured as above.
5. Barley, with grass-seeds.

Near Neath—1. Break up early in spring, cross-plough in June, lime 120 bushels an acre; dung in September; sow wheat.

2. Barley; 3. Barley or oats with clover, sometimes mixed with rye-grass; lay down for from four to eight years.

Near Margam, on inferior soil, gravelly, wet, &c.

1. Wheat on limed and dunged fallow; good crop.
2. Barley, indifferent crop, 3. Pease; 4. Barley and seeds.

Near Margam, on Eglwys Nynydd farm, near the junction of the coal and limestone tracts—1. Wheat

On limed fallow, sown in the general method, under furrow; three teams following each other, so that two furrows or a bout each, completes the butt or ridge, with the rean as narrow as possible. Seed three bushels, crop from 24 to 30. The former deemed a poor crop, though the average of the neighbourhood.

2. Turnips, with dung, sown under furrow, with the Rotheram swing, hoed once by home labourers at 8s. an acre; one hoeing sufficient. The larger bulbs fed in stalls, the smaller by sheep on the ground.

3. Barley; seed three bushels for wheat stubbles, and two and a half for turniped ground.

4. Clover; seed from 14 lbs. to 15 lbs. per acre; farmers in general give about the same quantity. Land has become tired of red clover. The white or Dutch now frequently used as a substitute; seed about 12lb. with about half a bushel of rye-grass per acre. Rye-grass gives an early bit, and shelters the clover.

5. Wheat-seed treated with water and lime. The use of lime is to dry the grain, and to give it a rougher handling, so as to be easier or more regularly sowed: barley has a coarser coat, and needs no such treatment."

Another—"After turnips, barley, then *pease* instead of clover; seed three bushels. Produce of a good crop from 30 to 40 bushels; but a pea crop is the most precarious of any."

In the Vale of Glamorgan, soil excellent; on white limestone, grey and bastard lias, &c.

1. Wheat on limed fallow; 2. Barley; 3. Clover; 4. Wheat, half limed, but not generally; 5. Oats; 6. Barley on manure, without clover, to recover in natural grass, "which in the western climature, and

on kindly soils, is always preferred to natural grass ; to remain for as many years as crops taken.

Another—1. Wheat on limed fallow ; 2. Oats ; 3. Barley on manure, and lay down. Some plume themselves on this course, being laid down with manure. Others say oats should be the last crop before laying down, as it requires but one ploughing, and does not destroy the roots of the natural grasses as much as barley, which requires three or four ploughings ; barley last, is the ruin of the natural grass system. “ Oat stubble thus left, bears feeding with sheep, and on it they thrive better than on barley stubble ; the ground is more firm, has more grass, &c.”

Another—1. Wheat on fallow ; 2. Barley ; 3. Peas on manure ; 4. Oats and clover ; 5. Clover ; 6. Wheat on ley, limed ; 7. Winter vetches, or stubble turnip ; 8. Barley, and lay down in natural grass.

Another—1. Wheat on fallow, limed ; 2. Barley with clover ; 3. Clover, mowed twice, once for hay, then for seed, or grazed till June, then kept for seed ; some graze the whole summer, where horse-folders are scarce ; 4. Wheat ; if the soil be thought impoverished, it is limed, otherwise not ; 5. Turnips, with dung ; 6. Barley ; 7. Oats ; 8. Barley manured, which is commonly the lullaby of the course, the land being to be put to sleep for as many years as crops taken.

“ One or other of these courses are the general practice in the Vale, and form the most prominent of the Glamorgan tillage ; deviations from these courses, are the effects of circumstances, restrictions of lease, dearth of grain, or avarice to suck the vitals of a farm before the expiration of a lease.”

Another—1. Wheat on fallow, limed 50 cranoe per acre (450 bushels), seed  $2\frac{1}{2}$  or 3 bushels.

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2. Winter vetches or turnips.
3. Barley with clover.
4. Clover, mowed twice, or grazed once and then mowed.
5. Wheat, manured or not, according to circumstances.
6. Barley and clover.
7. Clover, as above.
8. Autumn-fallow and wheat.

Another!—1. Wheat on fallow limed.

2. Wheat on the burnt stubble. The farmer said, he was persuaded that a crop of wheat would exhaust the soil less than that of barley; and he had a stronger motive; he could sow wheat on one furrow, instead of giving three or four ploughings for barley; besides wheat, at nearly an equivalent produce, being a more valuable crop.

3. Barley, on winter-fallow, manured with dung and ashes.

4. Clover, mown twice, once for hay, and once for seed.

5. Wheat, on clover-ley, sometimes limed with from 20 to 25 cranocks (160—225 bushels) per acre.

6. Wheat again as before, &c.

Another—1. Wheat on fallow; 2. Barley; 3. Clover; 4. Wheat; 5. Pease; 6. Wheat.

Another—1. Wheat on fallow, with full liming; 2. Barley; 3. Clover; 4. Wheat; 5. Barley; 6. Oats, and lay down with manure, “to recover in natural grass for six or seven years. The fourth crop of wheat, without any manure; the effect of the abundant liming given to the wheat on the preceding summer-fallow being supposed still to operate. The quantity of lime



commonly bestowed on a fallow, &c. will be seen in the Section on *Manuring*.

Another—1. Wheat on fallow, limed and dunged in the usual way; 2. Pease; 3. Barley; 4. Barley, with limed headland compost, and lay down for four years at least. Some take the fourth crop, that is, the last barley crop, without manure, which is deemed bad husbandry."

Another, on kindly soil—1. Wheat on limed fallow; 2. White pease on dung-manure; 3. Wheat; 4. Barley, and lay down.

Another—1. Wheat on fallow, manured with lime on headlands; 2. Barley, with clover; 3. Clover, hay or pasture, or both; 4. Wheat; 5. Barley, with clover, on a dressing of dung and coal-ashes; lay down for four years.

*Observation.*—The second crop of wheat in a course, if manured, it is generally with lime-compost; the dung being reserved for the succeeding crop of barley, &c. to be laid down in natural grass, which is generally preferred to the cultivated kinds.

In the south-eastern part of the Vale, flag lias tract, a strong retentive soil, reckoned a good course, and practised by a few:

1. Wheat on sun and wind fallow; 2. Barley with manure; 3. Oats; 4. Beans; 5. Wheat; 6. Barley or oats with manure, and lay down in natural grass from four to seven years.

Another—1. Wheat on a burnt fallow, without lime; 2. Barley; 3. Beans; 4. Wheat with manure, frequently without, in the latter case; 5. Barley with manure, and lay down as above.

At Clasemont, near Swansea, in the coal tract;

1. Wheat

1. Wheat on fallow, ploughed the first time in January, or later; the second time in June, limed with about 80 loads of three bushels each, per acre, laid on the fallow in small heaps, about 18 from a cart load, spread as soon as slaked, and either ploughed or harrowed in immediately; before seedness, last year's muck is added; wheat-seed of the last year's crop, if procurable, supposed to be less liable to smut, treated with a pickle of various ingredients; sow moist land the first or second week in September; three bushels per acre is then sufficient; later sowing requires more; always under furrow, in two-bout ridges of three feet width; "narrow ridges shelter the blades, and increase the surface." "Average produce, 24 bushels per acre; as much as from 45 to 48 bushels have been had from fresh land."

2. Upon sound land, barley; first ploughing in November, &c. the second in March, the third before sowing; seed three bushels and a half per acre; sometimes sown under furrow, when the soil is finely reduced; produce from 28 to 30 bushels per acre. Or,

2. Upon moist land, oats on one furrow, in March; seed six bushels, average produce 42 bushels per acre; some crops yield 60 bushels.

3. Whether the second crop be barley or oats, it is attended with grass-seeds: clover 12lbs., rye-grass one bushel per acre, covered by a small harrow, the horse going a quick pace, mounted by the driver. Crop from a ton to 50 cwt. per acre, then grazed.

4. Wheat; 5. Turnips, with dung, and sometimes lime. "Turnips on rough lands, pared and burned and limed, are never subject to the fly."

6. Barley or oats, according to the soil, with clover and rye-grass seeds.

Sometimes pease succeed wheat, sometimes potatoes, and either of them meliorate the ground for barley. Wheat has been tried after potatoes; but as it could not be sown till the latter end of October, it did not ripen betimes.

Common course in the vicinity of Clasesmont; i. e. Llangyfelach, coal tract: 1. Wheat on fallow, limed on upbreak 100 bushels per acre; cross-ploughed, then dunged, &c.; 2. Barley; 3. Oats; 4. Barley, manured with limed headlands, or some dung, and laid down in natural grass. Sometimes the fourth crop has no manuring. Other times the manured oat-stubble is sown with 4th wheat, and 5th barley, with or without clover, to rest from labour five years.

In Gower, west of Swansea, sound soil on limestone; some rich land near the Mumbles, letting for 3*l.*, 3*l.* 10*s.*, and 4*l.* per acre. The Duke of Beaufort grants three lives' leases, esteemed here the best preservatives of land, "*as the farmer finds a warmer interest in the soil.*"

"Course of leaseholders for three lives"—"1. Wheat on fallow, limed on the first ploughing with from 50 to 100 stacks or horse-loads (150 to 300 bushels) per acre, and as much dung on the third tilth; 2. Barley; 3. Oats; 4. Barley, with dung and coal-ashes, and lay down for four years without seeds."

"Course of tenants at will, in the same tract."—"1. Wheat on fallow, with half the above quantity of lime and dung, or less than that; 2. Barley; 3. Oats; 4. Barley, and lay down for four years; or as soon as do, 5. Oats, and oats as long as any can be had."

On enquiring why turnips and clover were not cultivated? The answer by tenants at will was, "We are stinted in our tillage; landlords will seldom permit it

nit old pasture to be broken; and our arable is so scanty, that we cannot be without a field for a year for turnips or clover. We must have as much corn of one kind or another, as will supply our families and workmen; and corn in the market brings in immediate money for common occasions; without it, we should be obliged to sell our cattle at an improper season, and to disadvantage. Turnips or clover would deprive us of a fourth part of our corn land, already by far too little."

Were these honest farmers able and willing to give credit to turnips and clover only for one year or two, they would soon be able to furnish the market with as much corn, and themselves with more money than by their present practice.

At Reynoldston:—1. Wheat on fallow, limed on the first furrow with from 75 to 90 bushels per acre; twice as much, and more, if to be had, of dung on the third furrow, harrowing well with every manuring, to incorporate the manure with the soil, sowed on the fourth tilth; 2. Barley; 3. Oats; 4. Barley, and lay down, without clover or any other grass-seeds, for four or five years. A crop of oats is often taken before the fallow, and frequently no manure is given with the fourth crop; this is deemed bad, but cannot be helped; if manure can be given, then the fourth crop may be wheat; 5. Barley, and lay down; or fourth crop, so manured, to be barley with clover, to be grazed or mowed, and sowed with 5. Wheat; 6. Barley, and lay down from four to seven years.

Another—1. Wheat on manured fallow; 2. Barley, with clover; 3. Clover; 4. Wheat on ley; 5. Wheat again on bastard or rash fallow, with half liming; 6. Barley, with clover, to lay down: give as much dung



dung as can be spared from the succeeding arable land with the last barley crop, with or without clover, to be laid down for six or seven years.

"Here are two manurings, one on the full fallow, the other on the rash fallow, exclusive of a chance for dung on the last barley crop. Three crops of wheat, two of barley, and one green crop of clover, in six years. The last crop of clover is not always given. This, when the long alternation of pasturage is taken into the account, may be considered as no bad system, especially if dung be given with the last barley crop."

In *Pembrokeshire*:—1. Wheat on lime, or lime and muck-fallow; 2. Barley; 3. Oats; 4. Oats on manure, and lay down for as many years as crops. Sometimes muck, and sometimes lime, is given with some of the middle or last crops, as it may be convenient. Lime and muck with the last crop, to lay down for natural grass, is supposed to be very superior management. An idea prevails here, as well as in the other maritime counties, that it is best to lay down in natural grass; and very few of the common farmers lay down with clover or any other grass-seeds. The good and even middling soils of South Wales, they say, return more rapidly to their natural grass, than those of the eastern and midland English counties, owing to the greater humidity of the western coast climature; so that by the old school farmers, clover is only an intermediate link in the course, as preparatory for wheat, rather than for laying down.

Another—1. Wheat on fallow; 2. Barley; 3. Oats with clover; 4. Clover; 5. Wheat; 6. Barley or oats, and lay down for as many years as crops.

Another—1. Wheat on fallow; 2. Barley and clover; 3. Clover for one or two years; 4. Wheat;  
5. Bar-



5. Barley, with clover; 6. Clover; 7. Wheat; 8. Barley or oats, and lay down as above.

Another—1. Wheat on limed fallow; 2. Barley; 3. Pease on dung manure; 4. Barley or oats, with clover.

“An approved and long practised course.”—1. Wheat on fallow; 2. Barley or pease; 3. Oats, and lay down for four years. “To take a second or more crops of oats, is a reprobated practice. Some poor farmers, however, take a fourth, fifth, or sixth crop of oats before they lay down; but even those farmers themselves admit it to be a bad practice, and plead necessity for adopting it.” This excuse is inadmissible, as the farmers, by such a system of cropping, impoverish themselves as much as their farms.

Near St. David's, in the hundred of Dewis' Land (Pebidiog)—1. Wheat on fallow of two ploughings, manured with twelve small cart-loads of sea-sand, twenty loads of dung, and one or two of lime, per acre; 2. Pease; 3. Barley; 4. Oats; then rest five years.

Another—1. Wheat on manured sand-fallow; 2. Barley; 3. Oats; or 2. Oats, and 3. Barley; and left to sward for three years; and so on in triennial rounds of tillage and grass.

In the hundred of Rowse (Rhos), at Capetown, &c.—1. Wheat on fallow; 2. Barley, with clover; 3. Clover; 4. Wheat; 5. Oats, with or without clover, and lay down for five or six years. Top-dress the new grass, if practicable, the first or second year.

At Nolton:—1. Wheat on fallow, manured with 80 bushels of lime per acre, twice as much dung, and as much shell-sand; 2. Barley or pease; 3. Oats: “if  
the

the ground is left to sward after this, it is in excellent condition: if not, the fourth crop is barley and clover; 5. Clover for one year; 6. Wheat; 7. Barley or oats on manure, and lay down; but if laid down after the first round, a large crop of the finest hay will be obtained the first year."

About Newgall—1. Wheat on sand-fallow; 2. Barley; 3. Oats; 4. Barley on manure; 5. Oats with clover, and lay down.

It is to be understood, that land is to be laid down in grass for as many years at least, as it has been in tillage; such is the South-Walian maxim in general.

In the Vale of St. Florence—1. Wheat on fallow, limed with eight or ten cart-loads of 20 bushels each, and some quantity of muck per acre; seed three bushels on good strong soils: some give three bushels and three quarters per acre; 2. Barley; 3. Sometimes pease; but not common, being much less cultivated than formerly; 4. Barley; 5. Oats and grass-seeds: some omit the last crop of oats, and sow seeds with the preceding crop of barley.

In Castle Martin—1. Wheat on fallow, first ploughing in spring; second in July, dragged, and limed with about 160 bushels per acre, sometimes 200 bushels—"When the lime is spread, hot or cold is immaterial"—Spread dung in September, and sow under furrow; seed about 3 bushels, generally more; average produce 20 bushels, and from that to 24 bushels; 2. Barley, "with which, by their leases, they are bound to sow clover; but *ecce*"; 3. Barley; 4. Barley; produce of first barley crop about 28 bushels; second crop of ditto, from 16 to 20 bushels; third crop still less."

Radnorshire—Above the the Forest—1. Wheat of manure

manured fallow, limed with from 60 to 75 bushels per acre; seed from 15 to 20 gallons, according to the time of sowing, whether early or late; 2. Barley; 3. Oats, and seeds.

Another—1. Wheat on dunged fallow, and limed with from 40 to 60 bushels per acre; 2. Barley; 3. Pease; 4. Oats, and clover.

Below the Forest—1. Wheat on fallow; 2. Pease; 3. Barley and clover; 4. Clover for one or two years; 5. Wheat on clover ley.

Vale of Radnor, flat land, moist beds of clayey loam, running through the gravelly soil—1. Wheat on fallow well worked early in summer, mucked in July, and ploughed into three bout ridges, about four feet wide; cross-harrowed about the latter end of September; sowed under furrow, and coped on the middle of the ridge, to preserve the ground dry. Where these narrow ridges are not thought necessary, three, of the former furrow, are collected into two at seed time. This makes the wheat ridges about six feet wide each. Ploughing in the muck in July, is a common and approved practice: it considerably expedites a busy seed-time.

2. Barley; 3. Pease; 4. Wheat; 5. Turnips; 6. Barley and clover.

There appears to be less fallowing for wheat in Radnorshire than in any of the other five counties, in proportion to the wheat cultivated. We observed but few in the vallies of the Tame and the Lug, from Knighton to Presteign; a few more in the stronger soil of the Vale of Radnor, and still more where it is less necessary, in the lighter soils of Pain's Castle; but there, as in most other places, the farmer's *dernier resort*, when his land gets weedy, is a *summer-fallow*.

“The system of *fallowing* is at present but little used



used in Radnorshire; the preparing of land by means of turnips, potatoes, and other green crops, being found to answer the farmer's purpose much better."—*Th. Fr. Lewis, Esq.* 1812.

II. *Courses commencing with wheat on pasture ley; wheat on clover ley being considered only as a middle link in the course.*

The first crop of wheat in these courses, is sowed on one furrow, in autumn, and harrowed in. It seems to be an ancient practice revived, and of late brought again into use as a substitute for the tediousness of a summer-fallow, and in cases where a fallow is not at all necessary. Land best adapted to this course, is such as has rested from tillage for a number of years, and is not over-run with couch-grasses, and other strong-rooted weeds; and the soil ought moreover to be of a free working texture, the character of most of our soils, excepting a few tenacious clayey loams: in such cases, especially in the inland eastern counties of Wales, the crops of wheat on one ley furrow, are more certain than those of summer-fallows; they bear hard winters better, and the grain is generally superior in value.

The most approved mode of manuring for this ley-crop, is laying dung on the pasture the preceding autumn or winter, with a subsequent good dressing of lime in June or July. Though this mode of manuring be acknowledged to be of superior effect, exclusive of one summer's improved grass, yet the more common practice is to lime on the sward in summer, and defer the dung until autumn, to be ploughed in immediately at the seed-furrow, though farmers allow that such recent dunging frequently causes a luxuriance

riance of straw, and a correspondent lightness of ear, and a greater liability to mildew or blight. Lime is not always bestowed on the sward the preceding summer, but is kept in large heaps in the field to be spread on the furrow, and harrowed in with the seed.

In autumn, the ley is ploughed generally into five or six-bout ridges, sometimes of double that width, with the plits of sufficient staple depth, and of a proper angle of reversion, being 40 degrees. About three bushels of seed is sowed on the furrow per acre. The soil being operated upon, and rendered more friable by the previous manuring, the seed will be harrowed in effectually upon kindly soils, by going twice over the ground with a sharp-tined drag, and once with a one-horse harrow, or more or less according to the state of the soil. As soon as the harrower finds the seed covered, he desists; as more harrowing does more harm than good to a winter crop, upon such soils; but upon strong clayey loams, the operation of harrowing is extremely tedious; as frequently several rounds with a four-horse harrow, and several more with a three-horse harrow, make but a small impression.

The succeeding crops after wheat on ley, are of all variations, similar to those already enumerated after wheat on summer-fallows; but as some further light may be thrown on local practices, we shall here insert a few.

*East Wales, Brecknockshire, on the Wye.*—

1. Wheat on one furrow, seed  $2\frac{1}{2}$  bushels, or nearly 19 gallons per acre; 2. Barley, seed  $3\frac{1}{2}$  bushels, or 30 gallons; 3. Oats; 4. Pease, with dung-manure—
- \* Dung, in a moist summer, causes pease to over-grow,



grow, so as not to pod well. In future, I will lime for pease, and reserve the dung for the succeeding crop of wheat."—5. Wheat; 6. Barley and clover.

On the Usk—1. Wheat on old ley, manured with dung on the sward in October; seed 20 bushels on 10 acres, on the furrow, and harrowed in: produce 400 bushels; 2. Barley; seed three bushels sufficient, though many sow nearly four upon an acre; average produce 30 bushels, and more after turnips; 3. Oats, seldom sowed; early soils are unfavourable to oats; seed same as of barley, and produce less; 4. Pease on manure, seed same as of wheat; average produce less.

In *Caermarthenshire*.—"Some farmers manure the ley with lime and dung, give the land one ploughing only, and sow wheat on the flag or furrow, harrowing it well to cover the seed, and pulverize the soil."—*Original Report*, p. 14.

"This is an old practice in Glamorganshire; and is now, after having been almost entirely laid aside for more than 30 years, recurred to again."

"Three corn crops—1. Wheat on lime-manured ley; 2. Barley on dung; 3. Oats, and lay down, is in South Wales termed the course of a gentleman on his own freehold, and is supposed to be the best of any in the general ancient practice."—*E. W.*

Laugharne Marsh, on the Bay of Caermarthen—  
"1. Wheat on one furrow of a manured ley; 2. Beans;  
3. Barley on the third furrow; sometimes a crop of  
oats succeeds the barley, but this is not the general  
practice; the land is commonly left to lie in barley  
stubble, without any grass-seeds, and it soon recovers  
its sward, and produces good crops of hay and grass."

It is a sandy loam, with a substratum of rich clay. The land is ridged up into butts of about 20 feet wide, and as high as the soil will bear, so as to let the water fall into the reans, and thence into the main drains\*."

When we visited this naturally fertile spot, we found the soil much more to be commended than its management. There was only one piece of fallow in about 3000 acres, and it was then first tried by way of experiment; but if fallows are intended to rid the soil of weeds, they are as necessary here as in any place we have seen. We saw one piece confessedly under its twenty second crop, eleven of beans† and eleven of barley, alternately; it was then under the eleventh crop of barley, with clover to be laid down to rest.

One of the proprietors of the Marsh informed us, that forty white crops had been taken there, without giving any manure; and that a wheat crop of 22 acres produced 870 bushels, exclusive of sheddings and tailings, though not the best crop on the Marsh. The greater part of this tract was formerly the property of Judge Powell, who acquitted the seven bishops, in the reign of James II.

"The soil of Laugharne Marsh is a fine loam, and rather strong on the land or cliff side; producing excellent wheat and beans; but shamefully driven by incessant tillage of wheat, beans, barley, oats; barley, oats, then wheat again, and the same course repeated for 20 years, or rather from time out of mind. What manure they have, they give the wheat crops; sometimes a little to the second barley crop; never any lime‡; and yet with a little

\* Caermarthen Original Report, p. 15.

† Ten returns of beans is reckoned a good crop; average six.

‡ This is the more to be wondered at, as there are but few places whose soils would apparently be more benefited by calcareous manures

little of it, it would do wonders; no better soil any where; full of white clover naturally; excellent for dairy farms, and for fattening, were markets more convenient. Mr. C. sends his cheese and butter from hence to Bristol; and is inclined to bring his farm gradually into pasturage."—*E. W.*

"Laugharne Marsh is now improving apace. It is all secured from the sea by embankments; and the secured land will let for two guineas an acre. The Dutch plough introduced there did not answer."—*H. Lewis, Esq.*

In the Vale of Glamorgan, by the smaller farmers:

1. Wheat on good ley; 2. Wheat on Welch or autumn fallow; 3. Barley and manure; 4. Oats and lay down.

By *M. S.*—1. Wheat on old pasture ley, sometimes on the furrow, and harrowed; sometimes under the furrow, on the sward; in the latter case, the wheat when grown appears as if drilled; 2. Barley and clover; 3. Clover, first mowed for hay, the second crop for seed; 4. Wheat on the manured ley; 5. Barley and clover as before; 6. Clover; 7. Wheat; 8. Barley with manure, and lay down in natural grass; 9. A crop of hay.

After the extraordinary dearth of 1800 and the year

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and still fewer tracts where such alteratives or stimulants of strong loams are more conveniently procurable: its northern and western verges are lined with lime rocks and lime kilns, and its southern and eastern coast with sea-sand. Necessity is the mother of industry as well as of invention: poor soils, notwithstanding our friend Tull's hypothesis, must be hired with manures, otherwise the plough and the harrow were better laid aside; whereas richer soils are frequently treated by their indolent managers as if they contained the inexhaustible principle of fertility within themselves.

following;

following, farmers became unusually anxious to reap productive crops; and many of them spared not their best pastures. The necessity of the times is the best apology that can be made for the following course, which we observed in the Vale of Glamorgan; and who knows what shifts will be resorted to after the still greater dearth of 1812.

1801. 1. Wheat on the ley of an old pasture of 14 acres, without any manure; crop of straw extraordinary; produce of grain about 10 *llestraid*, or 26 bushels per acre.

1802. 2. Wheat on the first furrow of the stubble, no manure, less straw, but more grain than the first; produce about 31 bushels per acre.

1803. 3. Wheat without any manure excepting the burnt stubble; produce about 22½ bushels per acre.

1804. 4. Wheat, on Welsh or hot fallow, limed at the rate of 50 cranocks, or about 450 Winchester bushels per acre, sowed under furrow, a large crop, yielding 36 bushels per acre.

These 14 acres in four successive years can have produced no less than 1600 bushels, or 200 quarters, of wheat.

These crops were raised upon the excellent soil of the grey-lias tract. The soil of the blue or flag-lias is still stronger, and is occasionally forced to produce successive crops of wheat. On the latter we found an instance of, 1. Wheat on ley; 2. Beans; 3. Wheat; 4. Beans; 5. Wheat; 6. Beans. On asking the farmer what manure he had bestowed on the six crops? his answer was—" *Dim on d houl ac aradr*;"—i. e. nothing, but sun and plough.

A favourite course on the flag-lias tract is the following: 1. Wheat on ley; 2. Barley; 3. Oats;

4. Beans; with a repetition of the same for three or four rounds, giving one ploughing only for each crop, with very little of any other additional labour. Knife-rollers, and sharp harrows are wanted here to supersede the use of wooden beetles. What dung manure they bestow on their arable land is for the barley crops. Clover and turnips are seldom sowed by common farmers. After paring and burning the sod, which is sometimes done at the expense of 24s. or 25s. per acre, clover comes into the course, and on its ley they sow wheat. Some add lime to the ashes of the burnt fallow, which commonly produce wheat of the finest sample: this wheat is succeeded by barley; oats, beans, then again wheat, barley, oats; then they think it time to lay it down to sward naturally; and if true to this course, they call it good husbandry. Beans are not so much grown as formerly, owing, as they say, to the want of markets for the produce. The produce of crops in this tract, raised by gentlemen who reduce the soil by proper tilths for green or leguminous crops, must be very abundant: indeed we almost hesitate to mention the amount we have heard to be raised by common farmers, as above; so much as from 35 to 45 bushels of barley, and from 40 to 50 and 55 bushels of wheat. The natural texture of the soil accounts for its being more productive in wheat than in barley.

On the coal-tract, near Caerphili:—1. Wheat on one furrow of a hide-bound ley, lightly top-dressed in March with ashes of coal in one part, and peat-ashes in another, in addition to ashes harrowed in with the seed in October. The different ashes produced no difference in crop.

2. Oats,



2. Oats, limed, with white clover and Paisley ryegrass:

3. Hay; 4. Pasture.

In the Vale of Miskin, modernly called the Vale of Ely, in Glamorganshire, as well as in some other parts of South Wales, wheat is sometimes sown on the sward under the ley furrow; and is supposed to be a superior practice on soils that are rather light; as sowing on the furrow, and harrowing in, is to be preferred on stronger loams:

1. Wheat on old ley limed, sometimes pure, at other times mixed in a headland compost, and carried over the field.

2. Wheat again on a Welsh or hot fallow. The portion of lime commonly allotted to each crop is from 100 to 200 bushels per acre.

The stubble of wheat on ley is frequently so full of natural grass, that it has been preserved and mowed for hay; and afterwards fallowed and limed for barley.

On good soil on limestone, in Gower: 1. Wheat on ley, no manure; 2. Barley on as much dung manure as possible; 3. Oats, and lay down in fog from harvest till March, then eat it off, and dress the sward with lime, or lime compost: let the land then rest in grass three or four years; then repeat the course.

Another—1. Wheat on ley; 2. Potatoes; 3. Wheat; 4. Potatoes; 5. Wheat; 6. Barley with seeds, and lay down for six or seven years: lime the wheat and dung the potatoes.

In the western counties of Cardigan and Pembroke, fewer courses commence with wheat on ley; indeed it is not at all common in any part of Dimetia: there are several impediments to its taking place, under present circumstances; namely, the peculiar appropriateness

of the soil in general to produce barley; the predilection of the inhabitants for that grain; and the inefficiency of their common ploughs to cut a ley plot fit for the harrowing in of the seed: another objection to wheat on ley, in this tract, may be the general tendency of the soil to run into grass. On asking some farmers in the Valley of Tawy, on the Swansea Canal in Brecknockshire and Glamorganshire,—Why they did not sow wheat on clover leys, their soil being light, in preference to sowing it on summer fallows? Their answer was, that their climature was too wet for wheat on clover ley, as the crop would be choked with grasses: and yet these very persons were observed at the time to be sowing wheat on the sward, or under the furrow of an old pasture ley; much more likely, even than clover ley, to produce abundance of perennial grasses in the wheat crop: but “custom makes men move like engines;” they were habituated to one practice, and were not willing to change it for a better.

In Cardigan Upper—1. Wheat on ley; 2. Barley; 3. Oats, and grass-seeds. “Sometimes a crop of pease intervenes between the wheat and barley; in that case a good crop of barley is always expected.” Pease intervene between wheat and barley in other places: we found near St. David’s; 1. Wheat; 2. Pease; 3. Barley; 4. Oats, and rest five years. It is to be lamented that pea crops are so uncertain as to occasion a general complaint, and diminution of culture; otherwise one link would have been gained towards a compromise between the farmers of the Old and New Schools.

### III. *Courses commencing with oats on pasture ley.*

In some cold mountainous parts, courses are begun,  
conti-

continued, and ended in *oats*. On better soils, and in more favourable situations, oats too frequently precede wheat, without any previous manuring. Sometimes lime is spread on the infant oat blade in April or May, as preparatory for wheat; at other times, lime is carried into the field during summer, and laid in a heap, ready for the Welsh or autumn-fallow when the oat crop is off, and wheat is sowed either under or over the third furrow. Sometimes no fallow intervenes between the oat and wheat crop; one ploughing only being given for each. In the latter case, the ridges for wheat must be in the same direction as the previous ones for oats; and, on flat or wetish soils, in the same position also; as the coping, or veering, in Tull's phrase, for wheat, is in the same place as the former one for oats.

With imperfect ley ploughing for oats, especially with the old or long plough, the crown of the oat ridges will be much over-run with grasses; and, with the same kind of ploughing, the succeeding wheat ridges will be in the same grassy state. To prevent this in some measure, we observed a practice in the eastern part of Radnorshire, and in the adjoining part of Herefordshire, of ploughing two splitted bouts on the crown of the oat stubble ridge, then harrowing the same well, and at seed time to cope or veer again in the same place, so as to turn back the two splitted bouts, and then to finish the unploughed parts of the ridges, and sow wheat upon the whole, and harrow it in. This we consider as an improvement upon a bad practice; for as such the sowing of wheat upon oat stubble is now very commonly considered, even by common farmers. Others tell us, that "the first crop and the last are the most proper for oats. When a first crop, they are a



preparation for, and diminish the labour and expense of a subsequent fallow for wheat; and the stubble in the ground adding to the manure, may compensate for what the oat crop may be supposed to have taken from the soil. As a last crop they succeed well, and the subsequent fallow for wheat will never be the worse for them: or if the land be laid down after one course, the grass will come more freely and more abundantly after oats than after any other crop. Sow oats as early as possible."

Few of the above positions are tenable, excepting that which states that a crop of oats upon a ley furrow diminishes the labour and expense of reducing the tough sod of a wet carexy soil, which commonly covers a stubborn clay. On this subject we beg leave to insert the following instance, which fell under our observation during this survey. A farmer having entered on a mountain farm, in the state of nature, had occasion to cut a few holes in a poor wet clayey field, in order to have water convenient for wetting straw to cover some outbuildings. He found the subsoil just under the sward to be full of rounded stones: and as he wanted such to fill drains, he caused the field to be immediately ploughed, and men with pix-axes to follow the ploughs, and throw the stones upon the surface to be carted off; and what was wanted to drain the field itself. The sod was so tough, that he dreaded the labour of fallowing it for any crop; and it could not have been pared and burnt, owing to the vast number of stones it contained. The field, being ploughed in November, had the benefit of a full winter's frosts and thaws to render more friable its stubborn clay. The weather being very dry in April, he sowed it with the small black oat, on the autumn furrow. It harrowed

sowed freely, and covered the seed well; the surface feeling sandy under the foot. He was far from lime, and had no other manure to bestow upon it. His neighbours laughed at him for throwing away the oats upon such a soil, and with such tilth. He said he would be satisfied if the oat crop returned him the seed back; as the reduction of the labour of fallowing was the compensation he looked for. The crop turned out much better than he expected, yielding from 18 to 20 bushels per acre, and a good supply of winter fodder for lean stock.

After the oat crop, it was more easily reduced to a turnip fallow. Three ploughings and two harrowings rendered it finer mould than twice that number would have done in its original state. The turnip fallow was manured with lime, and dung and earth compost. The following April, the field was ploughed and sowed with bearded spring wheat, with clover and grass-seeds. May and June being chiefly cold and wet, many of the wheat plants disappeared, and most of them assumed a yellowish hue: they, however, recovered so much on the return of fine weather as to produce a tolerable crop; but the clover and sowed grasses were the most luxuriant in the neighbourhood, excelling those on better soils and in much lower situations. What puzzled the farmer was, that after such wet summers the wettest part of the field, being imperfectly drained, produced the best crops, both of turnips and wheat; but the sowed grasses in that part were more overpowered by coarse natural grasses. The field, by these three crops, and one full manuring with turnips, has been improved to more than four times its original value: it is now under its first crop of cultivated grasses.

There are *three* methods of managing coarse land the first



first year, in order to bring them under a course of tillage: these are; *fallowing*, sowing a crop of *oats* on the ley furrow, and *paring and burning* the sod. The farmer is to judge which of these three methods will best suit his soil under all its circumstances. If the land is in the state of nature, producing abundance of fern, furze and underwood, *fallowing and liming* is to be preferred. After the second or third ploughing and harrowing, the usual practice on such soils is to collect the roots, rubbish, and unreduced soils into rows, and burn them: and the ashes will add to the effect of lime. This may be done occasionally in time for turnips: if not, for meslin or rye in autumn; and where the fern, &c. are of luxuriant growth, symptoms of fertile soil, a good crop of wheat may be expected.

Where too many roots of underwood and fern do not too much impede the operation of the plough and the harrow, *oats* may be sown with advantage on the first furrow, without the labour and expense of a summer-fallow; and the following season, the fallows for turnips may be more easily and cheaply performed. We have seen a strong crop of the white short oat, on the first furrow of a ridded rough ferny land, on a declivity, southern aspect, followed by a crop of 25 bushels, per acre, of white free-boiling pease, without any manure for either crop. The soil was what is called a dusky ferny mould, intermixed with angular flakes of shale or shivery rock. The piece was then limed for wheat, and afterwards dunged for turnips; then 5. Barley; 6. Clover; 7. Wheat; 8. Turnips; 9. Barley, and laid down in seeds to rest.

The trouble of weeding the numerous fern rising in the crops, is the greatest objection to this second method of managing ferny soils; but that trouble, though it is a less

a lesser degree, will occur as well after a summer-fallow, or even paring and burning: caustic lime, bestowed freely on the first tilth, is the greatest mortifier of ferny roots, as will be further treated of in the Section on the Management of *Wastes*.

The *third* method, or *paring and burning*, is resorted to in cases where the two former methods are thought inexpedient: on soils too carexy and poor to produce a crop of the hardest oat on one ploughing; and too tough and matted with bent roots, &c. to be reduced by any reasonable expense by a fallow. Peaty soils, of considerable depth, which are generally covered with the coarsest of all herbage, are most improved by combustion and liming: indeed it seems to be the only treatment suited to its constitution.

Ferny soils, though they would fallow freely on first breaking up, or would produce a crop of oats on the first furrow, are, nevertheless, more generally pared and burned. It is the most certain treatment of any in producing crops of rye, which, upon an average of crops and seasons, on ordinary soils, pay about 180 per cent.: on the expenses of paring, burning, spreading, seed, ploughing, reaping, harvesting, and thrashing: but this treatment leaves no other manure in the soil for the succeeding crop than a few lixiviated ashes. Wheat or meslin upon a limed fallow, ploughed and harrowed three or four times, will pay upon a similar average, no more than about 130 per cent. on the expenses: but this leaves calcareous manure in the soil. A crop of black oats on one ploughing, owing to the smallness of tillage bestowed, will pay upon a similar average about 200 per cent. on the expense; but the soil has had not the least accession of manure towards the ensuing crop.

The

The leys, on which oats more generally commenced the courses, are those of old tilled land, beginning to degenerate, by becoming hide-bound, mossy, ferny, or rushy, or when it is found convenient or necessary to bring one piece under tillage, when another is to be laid down to rest.

In the hundred of Rowse (*Rhos*) Pembrokeshire, soils various, owing to the converging of the different tracts running across it, westward: 1. Oats on ley; 2. Wheat on autumn-fallow; 3. Barley or pease (of late pease, an uncertain crop, not so frequently sown); 4. Oats, and lay down for four years; sometimes clover with oats; then 5. Clover; 6. Wheat; 7. Barley or oats, and lay down for as many years as crops; sometimes another round takes place, with autumn-fallow for, 8. Wheat; 9. Barley, with clover; 10. Clover two years; 11. Wheat; 12. Barley or oats, and lay down for as many years as crops. Dung is given as often as possible with crops that are neither on clover-ley nor fallow; this (they say) will not exhaust the soil.

Near Hubberston—The same as the above course to 4. Oats without clover; 5. Wheat on autumn-fallow, and lay down with the next crop of barley. "One such course, if well fallowed and manured for wheat, will never exhaust the soil, but leave it in good heart, and will the first year produce plenty of grass. When a second round is taken, though fallowed for wheat, it will be necessary to give manure with the last crop, or the soil will be left in an impoverished state, unless it be naturally very fertile."

Too common;—"1. Oats on ley; 2. Barley; 3. Pease, with manure; 4. Barley, then oats, oats, oats,



oats, as long as oats will grow."—*Original Report of Pembrokeshire.*

"Land long in tillage gets tired of oats\*; then barley, pease, barley, and grass-seeds, are the approved husbandry."—*Original Report of Cardiganshire,* p. 26.

In Gower, Glamorganshire, on limestone—"I have a lease for three lives; my practice is as follows: 1. Oats on break-up; soil too luxuriant for wheat at first, as it would produce a large crop of little more than straw; 2. Wheat on fallow, limed with 100 stacks (300 bushels) per acre, and as much dung as can be collected; 3. Barley; 4. Oats; 5. Barley on manure, and lay down for as many years as crops. I never sow clover, because I prefer natural grass."

On poor soils, in the coal tract, by the proprietors of the iron-works:—"On these poor hill sides, which are the tumble down of the mountains, more of stone than soil; my course is, 1. Oats on ley, or oats with vetches for green fodder in summer, or hay, if the season will permit; 2. Wheat on well-manured autumn-fallow; 3. Barley with clover; 4. Clover; 5. Oats and vetches on winter-fallow, well dressed. These, I believe, are the only fallows needful. The land, with us, should after this product be laid down in seeds."—*R. C. Esq.*

A mountain course, in the coal tract:—1. Oats on ley; 2. Wheat on limed and dunged autumn-fallow; 3. Barley on coal-ashes, seldom with clover; 4. Oats, to lay down for as many years as crops.

Another—1. Oats on ley; 2. Turnips, with lime and dung; 3. Barley, with clover; 4. clover, spring-fed,

"Land gets tired of every other grain sooner than of oats."—*J. M.*  
then

then mowed for hay; 5. Wheat; 6. Oats, and lay down in grass; or, 6. Barley, and fallow for another round.

West of Ogmore, Glamorganshire:—1. Oats on ley; 2. Pease with dung and lime; 3. Wheat without manure; 4. Barley with lime and clover-seed; 5. Clover; 6. Wheat on limed clover-ley; 7. Barley and grass-seeds.

In the Valley of Teivy, Cardiganshire:—“ 1. Oats on ley; 2. Turnips, manured with lime, or with dung, or with both, according to the state of the soil; 3. Barley, seed about four bushels, three and a half sufficient per acre on the banks of the Teivy; best returns about 40 bushels per acre; 3. Clover, seed from 12lb. to 15 lb. per acre; 4. Wheat, sometimes on the first, other times on the second year's ley; seed according to the state of the soil and season, from two and a half to three bushels; and instead of steeping or brining the seed, it is moderately dried upon a kiln: “ by this practice my wheat crops have been entirely free from smut.”—*Rev. J. Griffith.*

The wheat generally followed by some green crop.

“ A common, and I think an absurd course is, 1. Oats on fallow; 2. Wheat; 3. Barley, to lay down.”—*E. W.*

#### IV. *Courses commencing with Barley.*

The preference given to this grain, of inferior intrinsic value, in leading courses of crops, and in occupying about two-thirds of the arable land of a great portion of three counties, is the more obviously accounted for, by the soil being peculiarly adapted to its production; and that in quantity and quality, proportionate to the extent of the tract, superior to most soils,  
and



and inferior to none within the British dominions. Though we were convinced of the appropriateness of the soil to produce barley of the first quality, yet we made enquiries among the farmers, why they did not sow less barley and more wheat? We had in answer repeatedly the old *Anglesey reason*: "Our soil and climature are better adapted to grow barley than wheat. An acre of moderate soil with us, and with good management, will produce 40 bushels of barley, and of better soil 50 bushels and more; whilst those acres respectively would not yield above half those quantities of wheat. Our barley also is of better quality than our wheat, weighing upon an average 58 lbs. per bushel; whilst the average of our wheat is not above 60 lb. though some of our prime samples weigh from 64 lb. to 65 lb. Barley ripens more certainly earlier; is sooner dry in wet seasons, and will bear more rain. It is also a grain that suits our fences, and herding of live stock, much better than wheat; and what is of higher consideration than all, none of the common people will buy wheat as long as barley can be had; and we must with reason cultivate that grain which brings us the readiest penny."

The barley tract under present discussion is of an undulated surface, bearing towards all aspects, but owing to the dip of the substrata, more generally inclining to the west or south-west: it is for the greater part cultivable, and extends from the river Dovey, on the border of North Wales, to the Teivy, about 47 miles, and from thence to St. David's, 27 miles more, in all 74 miles, at an average breadth of about 10 miles. Its barley has been celebrated for ages, is annually exported in considerable quantities, and bought into inland parts of stiffer soils for seed.

Though

Though both the soil and the barley of this tract are commendable, yet the courses of cropping too commonly pursued by the farmers of the Old School are very reprehensible. The common preparation for barley, is as follows : " Lay lime on ley in small heaps during summer, in autumn carry dung, spread both lime and dung together, and plough in ; in the spring following, if the soil be light, harrow only, and sow barley under the furrow ; if the soil be too strong for that operation, plough a second time in the same direction, and split in twain the autumn-furrow if possible : then sow barley and harrow it in."

Some gentlemen farmers sow clover with the first crop ; then 2. Clover ; 3. Wheat ; 4. Turnips, pease, vetches, or potatoes ; 5. Barley, with grass-seeds, and rest for from four to six years : then commence again with an alternation of green and white crops.

This is good, and may such good examples spread wider and further, until at last they push all bad courses, customs and practices into St. George's Channel.

" The husbandry of gentlemen is pretty similar in most places. We have here clean fallows, and drilled crops, with the most approved practices of the best cultivated counties. But as I wish to detail only the common management, I am obliged to add the following rotations."—*Original Report.*

I. 1. Barley on manured fallow ; 2. Pease ; 3. Barley ; 4. Pasture or hay.

II. 1. Barley ; 2. Barley ; 3. Oats ; 4. Grass.

III. 1. Barley ; 2. Barley ; 3. Pease ; 4. Barley ; 5. Grass.

IV. 1. Barley ; 2. Oats ; 3. &c. &c. Oats, and at last grass.

V. 1. Bar-

V. 1. Barley; 2. Wheat; 3. Pease; 4. Barley; 5. Grass.

VI. 1. Barley; 2. Wheat on barley stubble; 3. Barley; 4. Oats, and lay down in natural grass for five years: or, with the oats, clover, and rye-grass on high ground, and clover and ribwort on low land, and lay down as above; or fallow again with lime and dung, and repeat the course.

VII. 1. Barley on winter-fallow with clover; 2. Clover for one or two years; 3. Wheat; 4. Barley, or rather oats, and lay down; some take 4. Barley; 5. Oats, and lay down.

VIII. 1. "Lime the sward in summer, carry dung in autumn, and plough both in; plough again (*ail-aru*) before Allhallowstide, and with the spring tilth sow *barley*, either under or upon the furrow; 2. *Wheat* upon one ploughing; 3. *Barley*, with little dung, or oats without any, with clover and rye-grass mixed; or, 4. Pease; 5. Oats, with broad clover."

IX. 1. Barley; 2. Barley; 3. Barley, or oats, and clover; "some take 4. Oats, but land must be good to bear five or six crops running, and farmers do not chuse to run out the land."

We have noticed two crops of barley preceding wheat on the fertile soil of the Vale of Towy; the pasture ley, as usual, had been limed on the sward, ploughed in autumn, ploughed again in the same direction, in the spring, for barley. The crop lodged; barley the second year also lodged. In September the stubble was dragged and carried off into a dung heap, and wheat was sown under furrow, without manure, which succeeded well. This last instance is not inserted as a stigma upon the manager, who ranks among the most intelligent agriculturists in the Vale;



his common course of cropping will appear further on, in Class VI. of courses commencing with turnips.

The nine courses commencing with, and chiefly consisting of barley, already given, are sufficient to show the prevalence of barley culture, and the soil-barassing system which attends it; but they are not recorded as including the general practice of the tract; they only shew the common rotations among those who act as their fathers acted before them; and that upon soils more proper for barley than any other grain, whose character is light, consisting of a greater proportion of silex than argil, with a deficiency of the calcareous and carbonaceous ingredients. Other kinds of courses are frequent within the tract, which have been in part already noticed among the other classes, such as follow wheat on summer-fallows, wheat on leys, &c.; and among the more enlightened practitioners, it should be always understood, that a proper attention to an alternation of green and white crops, always prevails in this as well as every other part of South Wales.

*V. Crops of the same grain in succession for years, or in perpetuity.*

It was held by Bradley, and, after him, with a greater show of philosophical authority, by Dr. Woodward (Phil. Trans. No. 253), "that each sort of grain takes forth from the soil that peculiar matter that is proper for its own nourishment; 1st, the *wheat* draws off those particles that suit the body of that plant, the rest lying all quiet and undisturbed the while; and when the earth has yielded up all them, those that are proper for *barley*, a different grain, remain still behind; till the successive crops of that corn fetch them forth

forth too; and so the *oats* and *pease* in their turn, till, in fine, all is carried off."

This "baseless fabric of a vision" was successfully combated, and entirely overturned by the celebrated Jethro Tull, who in his *Horse-hoeing Husbandry*, Chap. XVI. argues thus: "If in this series of crops, each sort were so just as to take only such particles as are peculiarly proper to it, letting all the rest alone to the other sorts to which they belonged, as the Doctor imagines, then it would be equal to them all, which of the sorts would be sown first or last; but let the *wheat* be sowed after the *barley*, *pease*, and *oats*, instead of being sown before them, and then it would evidently appear, by the starved crop of *wheat*, either that some or all of those other grains had violated this natural probity, or else that nature has not given to vegetables such law of *meum* and *tuum*." "Charlock could not rob turnips; nor could any other weeds be of any prejudice to corn, if they drew off those particles only that suit the bodies of weeds, the rest *lying all quiet and undisturbed the while*; but constant experience shows, that all sorts of weeds more or less diminish the crop of corn."

"Farmers always find that the first crops are best, and the longer they continue sowing, the worse the last crops will prove, be they of never so different a species; unless the land were not in so good a tilth for the first crop as for the subsequent; or unless the last sown be of a more robust species."

After a series of arguments to confute error, Tull proceeds: "It being sufficiently proved that every sort of vegetable growing in the same soil, takes, and is nourished by the same sort of food; it follows from hence, that the beneficial effect of changing of sorts of



seeds or plants we see in the common husbandry, is not from the quality of the sorts of food, but from other causes; such as,

1. Quantity of the food.
2. Constitution of the plants.
3. Quantity of the tillage.

“1. One true cause of a crop's failing, is want of a quantity of food to maintain the quantity of vegetables which the food should nourish. When the quantity of food which is sufficient for another species (that requires less), but not for that which last grew, to grow again the next year; then that other species is beneficial to be planted after it.”

As for example, the food of plants in the soil may be so far reduced by a crop of wheat, as not to be sufficient to support a second crop of the same grain, which would require at least nine months store of food; but at the same time the reduced store could supply from three to four months stock of food for a crop of barley.

2. “The second true cause of a crop's failing, and of the necessity of a change of species, is from the constitution of plants; some require more food than others, and some are of a stronger make, and better able to penetrate the earth, and forage for themselves. Therefore *oats* may succeed a crop of wheat on strong land with once ploughing, when *barley* will not, because *barley* is not so able to penetrate as *oats*, or *beans*, or *pease*, are.”

3. “But the third and chiefest cause of the benefit of changing sorts, is quantity of tillage, in proportion to which food will be produced. Why wheat should not succeed wheat, especially on tough soils, is, that the first wheat standing almost a year on the ground,

ground, by which it must grow harder; and wheat seed-time being soon after harvest, there is no space of time to till the land so much as a crop of wheat requires."

"From all I have advanced, it appears evident, that when any sort of vegetable, by the due degrees of heat and moisture it requires, is agreeable to a soil, it may (by proper treatment\*) be continued *without ever changing the species*; or, which is the same thing, that a soil which is proper to one sort of vegetable once, is, in respect of the sort of food it gives, proper to it always."

Tull having demonstrated his propositions, in opposition to the theories of Bradley and Woodward, to our satisfaction at least, we proceed to corroborate our favourite author's assertions, by stating the following *account of the culture of barley perpetually on a tract of land in Cardiganshire.*

*Situation, Extent, &c.*—*Morfa'r Esgob*, or Bishop's Hamlet, so called from its being in the manor or lordship of Llanddewi Brevi, belonging to the Bishop of St. David's for the time being, is situate in the parish of Llausainffraid, on the main road leading from Aberystwyth to Cardigan, about eleven miles south of the former place. It is nearly a dead flat, with the Bay of Cardigan washing its western coast, and surrounded on all other sides with rising grounds, or grassy hills, the general character of the Cardiganshire mountains. The whole of the flat tract, hemmed in by the sea and hills, consists of several hundred acres; but that part on which barley has been annu-

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\* By the new Horse-hoeing Husbandry."—*Tull.*

ally sown from time immemorial, is no more than 80 acres, by one information, and 180 stangs or 120 acres by another.

*Soil.*—The soil is a light sandy loam, slightly cohering by being pressed between the fingers, crowded with rounded pebbles from a quarter to two pounds weight and more. The whiteness of the sand, and the dark brownness of the argil, intimately mixed, gives it a motley appearance of what is called *pepper and salt* colour. They say, that the depth of this bed of soil has not been ascertained, having occasionally ploughed to one foot depth without any alteration in the staple.

*Property.*—Though the tract is so confined as above represented, yet the property therein is so minutely divided, as to belong to upwards of twenty proprietors. The divisions or boundaries of property, like most common fields, consist only of narrow slips of unploughed land, with occasional blocks of terminal stones: a sketch of the inconvenient mixture and division of property in this tract, has been already given in Chap. VI. on *Enclosing*.

The rent of the tenanted quillies (*Lleiniau Llen Non*) has some years ago advanced from 1*l.* to about 1*l.* 5*s.* per stang; a rent equal to 1*l.* 13*s.* per acre, exclusive of about 7*s.* more per acre in taxes. The tithes of the barley tract of 80 acres, let some years back for 55*l.* a year, since advanced to 64*l.* payable to the Vicars Choral of the Cathedral of St. David's.

*Tillage.*—The plough here never enters the ground, save in the months of March and April; in the former for the fallow furrow; in the latter for the second

sec~~ond~~



row, always *under*. Two kinds of manure  
 ed alternately, shelly sea-sand, and sea-tang  
*marina*). Two crops of superfine barley are  
 ed after a dressing of *sand*, and only one crop  
*ing*. Lime has been tried without success. It  
 y was useless, but they say injurious, in “*de-  
 g the soil*.” They seldom sow less than four  
 s an acre, commonly more, and reap from 32  
 bushels. The barley is so equal, that it gives  
 lings by winnowing: it is eagerly bought for  
 to the colder soils of the interior of Caermar-  
 ire, &c. Time of sowing is from the beginning  
 end of April, and they commonly reap from  
 ddle of July to the beginning of August; about  
 weeks earlier than their neighbours, who are  
 alf a mile off on the rising grounds. Sea-sand,  
 ay, is the earliest ripener of all manures: it is  
 clean weeder, inasmuch as it prevents weeds.  
 act in summer, exhibits nothing but barley and  
 and the peasants, willing to exhibit all their  
 s swans, say, that even the straw is of superior  
 y, and that their horses eat it with avidity. That  
 ; but the cause is in the keen appetite of the  
 s, more than in the quality of the dry straw.  
 e of the quilletts have occasionally experienced a  
 are from the generally adopted rule of barley  
 er, by being under pease for one summer, and  
 nder clover. These green crops were such a rare  
 this indefatigable soil, that, as it were, out of  
 de to the manager, it would produce him a  
 f barley the following year without any manure,  
 at equal, if not superior to any manured crop.  
 imes have been written on the expediency and  
 ecessity of introducing green crops alternately

with those of corn, into the system of rational and profitable farming; but superior to any theory, or to any written relations of demonstrative evidences or matters of fact, is this very intelligible appeal of nature itself to the understanding of the lower class: it seems as if mother earth, the soil, were gifted with the organs of speech, and addressed the constant barley-growers in some such terms as these: "Now as you are going to enclose the wastes in the lordship of Llanddewi Brevi, the Commissioner will have the power of exchanging the very inconveniently mixed and divided property of the Lleiniau Llan Non; and you may be able to fence out your respective allotments with quicksets. Then each individual among you will be able to make the best of his own land; and if you behave well to me, I will repay you with threefold interest. Pray treat me with *turnips* the first year, and the second I will bear you 50 bushels of *barley* per acre, instead of your usual *thirty-two*; with that *barley* give me *clover* to heal my scorched surface, and graze that *clover* upon the ground, for perhaps you cannot mow it well, owing to the pebbly sward. Perhaps you will think it too great indulgence to give me peace the fourth year; but if not then, delay it not beyond the fifth year, and the sixth I promise you 60 bushels per acre of superfine *barley*, instead of your usual forty.

"Now, as I know your adroitness at argument, you will rejoin, that during the six years, you will have but three crops of *barley*, which put together, and taking for granted a gradual increase of crop, from 50 to 55 and 60 bushels per acre, will amount to only 165 bushels per acre on the three crops; whereas, if you pursue your old routine of constant *barley* for the six years, averaging between 32 and 40 bushels, you should



should have on the six crops 196 bushels per acre; so there would be by the new system, a defalcation of 31 bushels. But give me leave to call you my *Caredigion*\*, and to remind you, that the defalcation amounts to little more than five bushels per year; and that in lieu of them, you have in return three green crops, one of *turnips*, one of *clover*, and one of *pease*. Most probably you do not, as yet, put any great value on *green crops*; then give a willing ear, let your mind be unprejudiced, and open to conviction. If you do not value green crops, you nevertheless put some value upon your *live stock*, of horned cattle, horses, sheep, and swine. Your black cattle are very saleable to drovers, for the richer pastures of Kent, &c.; from thence they pass readily to the slaughter-houses, and from those to the tables of every class in the metropolis and elsewhere, who find their beef both more convenient in size of quarters and joints, and more marbly and eatable than that of overgrown beasts.

"Your small sheep are noted in North Wales, Glamorganshire, and England, for being quick feeders, and hardy. You will, in time, with good management, have pieces of turnips and clover in the same year, one to succeed another for the feeding of your stock; so that, with judicious selection of your breeders, you will be enabled in time to improve the size of your mutton from 8 lb. and 9 lb. per quarter, to 10, 12, or 14 lb.; which, when so improved, will be highly relished by the summer loungers at Aberystwyth, and other places; and moderately sized sheep

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\* Literally, *beloved friends*. *Caredigion* is the Welsh name of the tract of country now called from it, the county of *Gardigan*; and derived from *Ceredig* or *Caredig*, one of its ancient princes.

are the most marketable of any. You have been libelled, and perhaps justly, in not providing sufficient fodder and other winter comforts for your horses\*; but, by careful selection, and providing ample supplies of summer and winter food, in clover, vetches, &c. you will improve the size and shape of those useful animals, and consequently they will find a readier sale and higher prices in the markets. By providing clover and vetches for your horses, your cows will have a greater share of your scanty crops of hay, and even those crops may be much increased by a greater supply of dung-manure, collected by foddering your stock in yards and buildings, with the produce of your green crops. And if your hay-ground consists of stronger or more ungrateful soil than your arable, make composts of the dung with shelly sand, and the agreeable effect thereof upon your meadow-ground will be soon visible.

“ So much for *turnips* and *clover*: as for the value of the crops of *pease*, I need not say much; you and your countrymen know the value of the *small pea* for horses and pigs; but I wish you to try a more valuable crop occasionally; and, after clover, I promise you a good crop of free-boiling white pease, of double the value of a *crop of barley*, of which I am heartily tired, though you pretend otherwise. But, my *Caredigion*, risk not all these innovations upon my *ipse dixit* solely. Travel up the banks of the Ystwyth, by Nant Eos, and Crosswood; extend your views to Havod, but do not go beyond Briwnant; and again, nearer your home, view the Llannerch upon the beautiful Aeron.

“ So much may satisfy you, except you are obsti-

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\* Original Report.



nately blind, and save you the trouble of going as far as the Valley of Teivy from Llangoedmor to Llandyssul; that by an improved system of tillage, such or better than I have here recommended, you will be enabled to grow an equal quantity of barley on a much lesser number of acres to what you do at present, whilst *all* your land is devoted to it: the produce of the other acres to improve your live stock, as well as your meadow and pasture land by an increased quantity of manure, will be clear profit to you every year."

This *argumentum ad hominem* is more applicable to the farmers of more extensive tracts, than to those of the Lleiniau Llan Non; as, there, the minute division of property, as long as it exists, militates against the adoption of the new system in any considerable degree; it seemed applicable here only, owing to the farmers themselves seeing the improvement in crops of barley, succeeding clover and pease, without the customary manure in other cases.

Within the barley soil tract already described as extending from the river Dovey to St. David's, barley has, in many instances, been very repeatedly sown. We were directed by R. Warren Jones, Esq. of Llanina, to a piece of land, which, according to the testimony of tradition, had in 100 years borne 100 crops of barley, manured only with shelly sand and tang. The charm was broken in 1804; and wheat was sowed, three bushels to an acre, which produced 33 bushels. This soil at Llanina, lies upon the bed of marl which intersects the county of Cardigan from the sea, near New Quay, south westward over the Teivy into Caernarthenshire and Pembrokeshire; and of its extent, may be ranked among the most fertile soils in South Wales. Upon clover ley, manured with sea tang,  
and

and ploughed in, three bushels per acre, sowed upon the furrow and harrowed in, produced 38 bushels: this was in 1804, a blighty year of general failure in wheat crops. The natural grasses of this sequestered and beautiful valley are of the first quality; the land nevertheless lets very low, in proportion to its value.

*Oat crops, in succession for years,* are confined to the alpine climatures of the mountains. Execrable indeed are the courses and treatment of land adopted by the lower class or poor farmers of poor soils, as represented by all the writers of our County Reports. We are not inclined either to copy their libels or to imitate their example in this particular. The system is confessedly bad; but it originates in particular causes, which ought to be examined into, and removed; and then, and not till then, will the effects cease. Can the weak be strengthened by mere abuse; or children be instructed by only taxing them with ignorance? Mr. Clark, though free of his abuse when treating of the management of the lower class of farmers, yet acknowledges the propriety of their sowing oats in succession, and oats only, in the cold and elevated soils of the mountains; and we agree with him in the inference he draws therefrom. "Their making oats their principal grain is highly commendable: their taking such a *great number* of crops *successively* from the *same* land, only is reprehensible."—*Brecknockshire*, p. 36.

We were shown a piece of land on the southern declivity of the Vale of Usk, near the Crawnnon rivulet, which had borne fourteen crops of oats without intermission: the first ten crops were about *par*; and the four latter, better than could be expected, if they produced only double the seed. By this time, the farmer and

and his farm were not in condition to continue longer together. His successor ploughed the oat piece double the usual depth, to turn up virgin mould, at the commencement of winter; limed and manured it for turnips in June, and the following crop laid it down, as the term is, "in good heart."

VI. *Courses commencing with Turnips; wherein the alternation of Green and White Crops is not strictly observed.*

On a worn-out soil, in the Vale of Usk—"1. Turnips broadcast, on a fallow, dung alone; 2. Barley with clover, limed; 3. Clover, mowed once, &c. 4. Clover grazed; 5. Wheat with dung, on one furrow; 6. Pease; 7. Barley; 8. Oats; then fallow for turnips."—*Mr. Longfellow.*

Another in Usk Vale—1. Turnips; 2. Barley with clover; 3. Clover one year; 4. Wheat on ley; 5. Oats; 6. Turnips.

Another—1. Turnips with dung; 2. Barley; 3. Oats and clover; 4. Clover; 5. Wheat on the limed ley; 6. Turnips.

On the grey soil of the Vale of Towy—"Carry lime from the kilns, and lay it in small heaps on the ley-sward; when become slaked of the size of coal-ashes, on a calm day, and signs of rain, we spread it; and if it rains the next day, I am pleased, as the lime enters the ground in its most caustic state, destroying vermin, and rendering the tenacious soil easier to be fallowed. In June, carry dung and sow turnips; 2. Barley; 3. Barley and clover; 4. Clover; first crop mowed; the second permitted to grow till in blossom and full sap; rolled and immediately ploughed in. Sow wheat on the furrow, and harrow it in. By sowing  
ing



ing early, so as to finish by the first week in October, my crops of wheat have these last seven years escaped the mildew, when my neighbours' crops suffered; as mine were out of blossom when the mildew commenced: after wheat; 6. Turnips; 7. Barley and clover, to remain in grass three years or more, as the case may require."

In Llanwynno, coal tract, Glamorganshire:—On a peaty field, pared deep and burned, ashes spread, and limed, *turnip* seed were sowed after a shower of rain, and bush-harrowed;—"a better crop could not be\*;" 2. Barley on the second ploughing, with clover; both crops good; 3. Wheat on the limed ley; crop good; 4. Barley sowed in April, and top-dressed with lime the beginning of May; 5. Oats the following March, and top-dressed with lime the beginning of May; both crops good; 6. Wheat on a Welsh fallow; 7. Barley on coal ashes and some dung; 8. Oats, with clover and rye-grass, top-dressed in May with lime. The crop of clover and rye-grass very good: it was a fine meadow the second year, when the natural grasses prevailed; and has continued so ever since."—*E. M., Esq. communicated to E. W.*

"The quantity of lime for top-dressing, about one-third of the quantity requisite for a summer-fallow: the quantity for clover ley nearly the same, though

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\* A poor man having prepared a piece, by paring and burning the sod, was disappointed of a promised team to plough under his rye seed in September: he sowed the rye, and drew a thorned hurdle over it. He then cut water-furrows with his spade, just the depth of a plit, and scattered the mould over the intermediate spaces: the crop was equal to any that had been ploughed upon a similar soil.

"Vetches sown among drains, where the land could not be ploughed for rye, and covered with the ashes in spring, produced a good crop; soil very poor."—*J. L.*

more would be better: the quantity for autumn-fallow for wheat, from one-half to two-thirds of the summer-fallow allowance."

The above account is not satisfactory, without knowing the depth of the peat soil; and the quality of the substratum; and whether it was ploughed up to be mixed with the ashes and lime, or not.

In the Vale of Glamorgan—1. Turnips on fallow; 2. Barley; 3. Clover; 4. Wheat; 5. Barley, on manure, and lay down in seeds or otherwise.

In Pembrokeshire, near Haroldston:—1. Turnips on fallow, manured with shelly sea-sand; 2. Barley with clover; 3. Clover; 4. Wheat; 5. Oats and clover, or oats on manure without clover, and lay down; sometimes this last crop of oats is omitted, and an autumn fallow is substituted, for wheat: then manure the wheat stubble with shelly sand and dung, or lime and dung, for barley and clover; and "*lay down in good heart.*" Or, break up the clover brush for wheat, to be succeeded by barley and clover, or oats and clover, to lay down. Sometimes untoward seasons oblige them to leave the autumn fallow for pease in the spring, or till June, to be prepared for turnips; if so, "take one regular round, and a last crop of barley on manure, to lay down."

Near Kilgeran, on good soil, in the slaty tract: 1. Turnips on fallow; 2. Barley with clover; 3. Clover; 4. Wheat; 5. Oats, with clover, to lay down for three or four years.

*Radnorshire.*—*Course of Crops?*—"The county of Radnor is much improved in this respect, within a few years. The general course at present in the upper parts

parts of the county, and which is found to answer the purpose, is—1. Turnips; 2. Barley with clover; 3. Clover; 4. Wheat; 5. Oats: then either lay down for two or three years, or else proceed immediately again with turnips."

"The course which is recommended, and generally used, on the best arable land, is; 1. Turnips; 2. Barley; 3. Clover; 4. Wheat; 5. Barley; 6. Pease, or any other green crop; 7. Wheat; 8. Barley; 9. Clover; 10. Wheat; 11. Barley; 12. Oats; 13. Turnips, &c. This course however may be varied in part, according to the nature of the soil, and the species of grain that may be most wanted.

"The system which is recommended for the poorer tillage land, is, 1. Turnips; 2. Barley; 3. Clover and rye-grass, and lay down in pasture for four or five years; then oats on ley; 2. Wheat on summer-fallow; 3. Pease; 4. Oats; 5. Turnips.—Or, 1. Rye; 2. Oats; 3. Oats; 4. Turnips; 5. Wheat, or barley, according to the state of the soil; 6. Clover; 7. Wheat or rye; 8. Oats, and lay down in grass-seeds for three years: then proceed as before."—*T. Fr. Lewis, Esq.*

#### VII. *Courses following Paring and Burning the Sod of coarse Soils.*

Thomas Hassall, Esq. of Kil Rhiwau, on the northern tract of Pembrokeshire, about the year 1802, obtained a premium from the Society for the Encouragement of Arts, &c. for reclaiming about 1000 acres on his several farms, of high uplands, that might with sufficient propriety be termed *mountain*. He first enclosed the land, into fields of from ten to fifteen acres each: he next *pared and burned* the sod, adding to the



the ashes 160 bushels of lime per acre; and cropped as follows:

On the better soils: 1. Wheat; 2. Pease; 3. White oats, with red clover 8lb., white clover 6lb. hay-seeds two bushels, or rye-grass one bushel, mowed the first year's grass, as sheep would have destroyed it, especially on light soils. The lighter soils were a vast alluvial mass of schistose shale combined with nearly all the varieties of the tract, whether of stones or soils: on these he spread loam, four inches thick. The peaty soils were drained where requisite, pared, burned, and limed; always sowing the seed under the first furrow, as more ploughing would have injured the soil, by making it too light. On the lowland soils, as far as the dung manure extended he gave 80 loads an acre, with the ashes, and fallowed, sowing wheat under the second furrow; and laid these down with barley and seeds; and the lighter uplands with oats and seeds. This extensive tract, in the state of nature, was of very little value; bearing only furze of both kinds, fern, heath, rushes, &c.

The Rev. J. Griffith, Secretary to the Cardiganshire Agricultural Society, *pared and burned* 14 acres. On seven acres he sowed turnips in June, on the first ploughing; on the remaining seven he sowed wheat in autumn, on one ploughing; both crops good, without any manure but the ashes. The wheat was superior to another crop on a limed autumn fallow. Both crops were followed by barley and clover, with a dressing of lime and some composts.

James Ackland, Esq. of Amroth House near Tenby, had upon his farm a piece of 38 acres, flat, and in winter nearly covered with water; and producing only the coarsest aquatic grasses. The soil was about ten

inches of peat upon clay. It was drained, *pared*, *burned*, and limed abundantly. The first crop it produced was turnips; 2. Wheat; 3. Barley; 4. Oats, with clover and rye-grass. The crop of five acres was mowed so early as the 10th of May, and the second crop in the beginning of July, both together amounting to 98 cart-loads; which, at the low average of 5 cwt. per load, amounted to five tons of hay per acre. "The improvement increased the value of the 38 acres from about 4*l.* 10*s.* per year to at least 40 guineas." Mr. Ackland said he had no occasion to sow any grass-seeds, as the natural grasses immediately prevailed most abundantly; not the former aquatics, but such as are natural to drained and manured soils in low situations.

#### VIII. *Miscellaneous Courses.*

By these we mean, all such courses as do not come under either of the seven foregoing classes. Indeed it is hopeless to attempt an enumeration of the whole; for, when we look over the list of species of crops cultivated, and find them amounting to about fourteen; and reflect that custom, whim, or ostensible convenience, dictate the courses in much more numerous instances than any regular system; it will readily occur, that as many varieties of courses may exist as there may be changes rung on fourteen bells: we therefore despaired of enumerating the whole, which would also have been as useless as it was impossible.

1. *Potatoes*.—Since this valuable root has been admitted among cultivated field crops, it generally precedes either wheat or barley: in the earlier soils, wheat, though sowed late, after potatoes, will ripen betimes; in later soils, the case is reversed, and the potatoe



potatoe ground is ridged up for barley in the following spring. Potatoe fallows are more common on the western coasts of the counties of Cardigan and Pembroke than any part we have noticed; insomuch, that in many tracts there are scarce any other fallows to be seen. The Cardiganshire Agricultural Society has given premiums for the best crop of wheat after potatoes; but still barley is the most frequent successor. Near the grand vortexes of provisions, the iron, coal, and copper works, vast quantities of potatoes are grown.

On the middle limestone tract, near Merthyr Tudful: 1. Potatoes on dung; 2. Wheat with lime; and so on alternately for many years.

1. Potatoes on dung, with lime; 2. White oats; 3. Barley with manure; 4. Oats and grass-seeds, to lay down for two or three years.

On light soil in Pembrokeshire—1. Potatoes on dunged ley, formed into lazy-beds; 2. Turnips with lime; 3. Barley and clover; 5. Clover; 6. Wheat on ley; 7. Barley; 8. Oats with clover, and lay down for as many years as crops—"Good grass the first year; and soil much improved in condition at the second breaking up."

About Newgall—1. Potatoes with manure on winter fallow; 2. Wheat; 3. Pease; 4. Barley; 5. Oats with clover, on manure if it can be had, to rest five or six years.

Near St. David's—1. Potatoes on fallow of two ploughings, manured with 12 cart-loads of sea sand, 20 cart-loads of dung, and one or two of lime, per acre; 2. Wheat; 3. Barley; 4. Oats, and lay down for four years.

On the strong loams of the lias tracts in Glamorganshire, Laugharne Marsh, &c. *beans* have been grown

alternately with wheat for three rounds, or six years, successfully. Near Pyle, beans and wheat alternately for three rounds; then barley or oats on manure, and lay down, with or without grass-seeds, to rest for as many years as crops.

*Pease* also have been alternated with wheat on lighter soils; three of *pease*, and three of wheat, laying down with barley on manure, without grass-seeds. "These alternations of *pease* and wheat would have been more general, were *pease* more in request in the markets."

*Buck-wheat*, commonly called French wheat, is but very little cultivated; one instance of its commencing a course, occurred to us in Cardigan Upper, near Tregaron.

"1. Buck-wheat on exhausted land, ploughed in, full blossom, after being rolled, and limed to accelerate putrefaction; 2. Barley on the stale furrow, with clover and rye-grass, to remain two years; 4. Oats on one furrow; 5. Potatoes with dung; 6. Barley; 7. *Pease* with lime, barley, and lay down."

#### *On Restrictions in Tillage and Courses of Crops.*

These are as differently received, by different tenants, as they are variously planned and put in force by various proprietors, or their agents. If they are well planned on one side, they are generally well received on the other. Innovations of every kind are easier accomplished gradually than all at once. Farmers, of the peasant cast, who have been accustomed, and their fathers before them, to take five to seven or eight corn crops in succession, may be reconciled to a medium restriction of three corn crops with apparent satisfaction; whereas by binding them all at once to one corn crop and another green in perpetual alternation, they

they never set about it cordially; and are ever apt to express their sentiments in terms disrespectful as to the composity of their landlord's intellect.

We met with favourable instances of the effect of the medium restriction in several places: John Herbert Lloyd, Esq. of Kêlbebyll, in the Glamorganshire coal tract, on the expiration of his tenants' leases, granted them new ones of 21 years, terminable every seven years, on six monts notice being given by either party. By the new leases, his tenants are restricted from taking above *three* corn crops in succession, and those to be succeeded by turnips. Some of his tenants, accustomed formerly to take *seven* corn crops, are already so far reformed as to take *only two*; wheat and barley, or wheat and oats, as may best suit; and then—3. Clover; 4. Wheat; 5. Turnips; and voluntarily acknowledge their advantage by the change of practice.

In the wilds of Buallt, in Brecknockshire, in the slate tract, we met with an intelligent mountain farmer, whose lease permitted him *three* corn crops in succession; wheat, barley, and oats, the general triad of our lease-makers; "but," he said, "my landlord grants me greater indulgence than I wish; as I see the advantage of clovering this poor land betimes. In breaking up old land I fallow for wheat, and always sow clover with the succeeding crop, whether it be barley or oats. I am bound to clover with the *third* crop; but were I not bound at all, I would, as I always do, clover with the *second* crop; for by so doing, I keep my land cleaner from weeds than I could possibly do by taking more crops; even the very next crop, upon an average of seasons and soils, would begin to run wild; I therefore think it better and cheaper to *keep weeds out of*

the ground than to *drive* them out when once in." Upon expressing our approbation of his conduct, and that his landlord ought to be obliged to him; "Not at all," he exclaimed; "I am bound to do justice to my landlord, and by so doing, I am doing also what is most profitable to myself. I increase my stock by clovering so frequently, and that increases my stock of manure. I keep but a few sheep, as I lie inconvenient for the mountain summering; and I would not take 10s. a head for wintering any; as it would not pay me for the damage done by them to my clovers and fences."

Such persons as these, and we are persuaded there are great numbers, after once tasting the sweets of the medium restriction, would easily be brought, at the next seven or fourteen years lease, to a still further restriction, even to what is in many instances too prematurely anticipated, an annual alternation of green and white crops. They would also most probably be better qualified to carry on the annual alternation; both as to more enlightened notions of tillage, and better means as to pecuniary circumstances; two indispensable qualifications to carry on improvements, cordially and profitably.

In many cases, restrictions in tillage are very necessary; and may be calculated to do much good: in others they are overbearing; and tend to retard more than to accelerate improvements in agriculture; to lessen instead of increasing the stock of provisions. The forbidding of breaking up old pastures, when they are no longer profitable as such; and when land to an equal extent, or more, has been newly laid down in grass-seeds; the exclusion of hemp and flax from soils well adapted to their growth, and on no other soils will they

they be continued to be grown; and other such restrictions, are worthy only of those who judge of things more by hearsay than by innate reflection.

*On the Old and New Systems of Tillage.*

Among the well-informed tenants, we met with a few who were warm sticklers for the Old System, in opposition to rigid adherence to the New. They complained, that whilst the New System had been honoured with the plausible commendations of so many able writers, their System lay in obscurity, and was noticed only to be ridiculed. Our requesting one of them to commit to paper his comparison of the two Systems, as far as they were applicable to the soils and climature of South Wales; we were shortly after favoured with the following sketch.

“The *New System* of alternating green and white crops is, beyond a doubt, preferable to any old practice, for the purpose of supplying corn for the high demands of our present greatly increased state of population; when it is practised on *chalky* or *sandy* soils, and those combined with a comparatively dry climature: there it is peculiarly adapted to farms of perpetual tillage, and to the drilling and hoeing of perennial green crops for hay or other fodder. In such soils, comparatively barren of natural grass, chicory, burdock, or anything, is better than nothing. But in South Wales, especially the south-western and western parts of it, the humid climature keeps up a perpetual verdure and supply of natural grasses, which so unconquerably prevail, that in some, perhaps in most seasons, no care or labour can prevent their getting so much a head of cultivated grasses, turnips, and often enough corn, as greatly to injure those crops. Hence



rich loam, rather strong, on limestone;  
of the finest natural grasses in abun-

ably informed by a friend, that a  
Vale of Glamorgan, from the  
inclusive, produced *four*  
manure with the first  
buckle with the third  
crop; and that  
per acre per year.

materially from all the  
east, so much west, and  
south; but in having lain in  
at beyond the memory of man;  
and year, and the hay always foddered  
and in winter.

at I record, or even notice, such villanous  
opping with approbation, no man can possibly sup-  
pose; on the contrary, I think it a great pity that such  
a piece should ever be broken up at all. Nothing  
more is here intended, than to suggest an idea—that  
no system can with propriety apply nearly alike to all  
soils; that some soils may, without injury to them,  
admit of two corn crops successively (but I hope that  
no further concessions will be required), that the ut-  
most may be made of rich soils, so far as not to im-  
poverish them otherwise than transiently—that it re-  
mains to be known from proper experiments, what  
soils will admit of such a bold system as cannot be ge-  
nerally acted upon; and that suc<sup>d</sup> experiments have  
not yet, seemingly, been made; and that until such  
experiments and their results appear, we ought to  
defer being positive on many points, that are now very  
much insisted upon by those who possess that "*little*  
*know.*"

COURSES OF CROPS.

own; and other such metric-  
who judge of things more

willows.

in a few

the labour and expense attending the New System, is much greater here than in the midland and eastern counties of England. The natural productiveness of grass will for ever cause it to be so. Grass of excellent quality, and in large quantities, is the great wealth of Wales; it is that which nature bestowed bountifully upon it. To fly in the face of nature, to substitute art entirely instead of nature, or rather to make art absolutely supersede, instead of assisting nature, will certainly be wrong. The east of England, and the west of Wales, differ so greatly in soil and climature, and also in other circumstances, that the system best adapted to the one, will be found very defective, and in many things inapplicable to the other. Hence a wish arises, that philosophy and experiment should join hand in hand to accommodate the New System to the climature and soils of Wales; to alter it where necessary; to modify it in many cases; and possibly to form a *newer* system, retaining some maxims of the old one, that may be found more efficacious than any new thing that has yet appeared."

"It is on the least graminiferous, on the worst soils, that the New System succeeds best; that it is most profitable; and it is for soils of considerable sterility that the new husbandry is peculiarly calculated. To stint the rich calcareous loams of the hundred of Castle-martin, of Gower, of the Vale of Glamorgan &c. to the regimen that has been found necessary in lean, gravelly, or cold clayey soils, is certainly wrong: and yet such is the dragooning, equalizing, or levelling principles of the New System, that all soils, however different from each other, are viewed from nearly the same point, in no very different lights. The three tracts just named are alike in soil, and nearly so in clim="

climate, a rich loam, rather strong, on limestone; and productive of the finest natural grasses in abundance."

"I have been credibly informed by a friend, that a large old pasture in the Vale of Glamorgan, from the year 1801 to 1804, both inclusive, produced *four crops of wheat*, without any manure with the first two crops, only the ashes of the stubble with the third crop, and only lime with the fourth crop; and that the four crops averaged 25 bushels per acre per year. This field differed in nothing materially from all the fields around it for ten miles east, so much west, and four miles north and south; but in having lain in pasture for a period beyond the memory of man; mown every second year, and the hay always foddered on the ground in winter.

"That I record, or even notice, such villanous cropping with approbation, no man can possibly suppose; on the contrary, I think it a great pity that such a piece should ever be broken up at all. Nothing more is here intended, than to suggest an idea—that no system can with propriety apply nearly alike to all soils; that some soils may, without injury to them, admit of two corn crops successively (but I hope that no further concessions will be required), that the utmost may be made of rich soils, so far as not to impoverish them otherwise than transiently—that it remains to be known from proper experiments, what soils will admit of such a bold system as cannot be generally acted upon; and that such experiments have not yet, seemingly, been made; and that until such experiments and their results appear, we ought to defer being positive on many points, that are now very much insisted upon by those who possess that *little know.*

*knowledge,*" which "*is a dangerous thing.*" To bear too hard upon the powers of a soil, is not more improper, than to restrict its energies when they are strictly within its natural bounds."

"The *Old System* was well adapted to the ages wherein it originated, and through which it passed for a long period, when we advert to the population and circumstances of those ages. The *Old System* is here meant on its avowedly best principles; for regular and not bad principles it had. The old husbandry had in view the preservation and improvement of natural grasses; and to secure their reproduction in the greatest quantities possible, and as speedily as possible, after the few crops of corn that were then taken in a short course of tillage: hence its following maxims: 1. Lime on the sward in May, in preference to a summer-fallow, or lime and earth compost on the sward; in the limestone tract, either 200 bushels of lime alone, or 180 bushels with 20 cart-loads of earth to an acre; sow on one ploughing in October; 2. Manure for barley, with 25 to 30 cart-loads of dung per acre; 3. Oats without any manure; 4. Marl-dress (under this term was included every species of fossile manure) with 25 or 30 loads per acre for wheat; 5. Dung for barley, 6. Oats without any manure, and lay down in natural grass for as many years as crops. Keep the new grass in fog from harvest till March, then feed with sheep for one year at least; then sward-dress for alternate hay and pasture.

"Hence appear the maxims of the system: 1. Wheat to be always on lime or marl; 2. Barley to be always on dung; 3. Oats should never be manured, lest they should be too rank, or become all straw with a meagre grain; 4. There should always be an alternation of manures;

nures;—1. Manures of combustion, lime, ashes, &c. ;  
 2. Manures from putrefaction, as dung of all sorts ;  
 3. Fossile manures, marl, loam, clay, sand, &c. ; thus  
 repairing the wastes in regular rotation of the several  
 earths, calcareous, carbonaceous, siliceous, argilla-  
 ceous, &c. These technical terms, it is true, were  
 not then known ; but the facts were become well known  
 from the experience of ages. Instead of sward-dress-  
 ing for wheat, Welsh fallow was sometimes adopted,  
 as circumstances required.”

“ The great influx of population, occasioned by  
 opening, upon a very extensive scale, the collieries  
 and mines of the district, raised a much greater de-  
 mand for corn than theretofore. Unfortunately for  
 Wales, means of raising an adequate supply of corn  
 for this increased demand, by extending the Old Sys-  
 tem upon its best and adopted principles of tillage,  
 were not resorted to: but on the contrary, a very bar-  
 barous and ruinous system succeeded, that of taking  
 very numerous crops of corn in succession, without the  
 adequate supplies of manure. Lime was found to  
 force the ground ; and, in some limestone tracts, was  
 applied in that abundance which still continues. It  
 was considered as a fertilizer far beyond what it is in  
 reality ; and not as a stimulant that would ultimately  
 exhaust the land of all its vegetative powers. It is  
 this abuse, this violation of all system and principle,  
 which too generally every where prevails, that of  
 teasing the lands with corn crops, till they no longer  
 return the seed ; no longer yield any thing but weeds ;  
 it is this, I say, that modern writers expose to public  
 view with exultation, and say, ‘ this is the Old Sys-  
 tem of Husbandry ! ’ ”

“ It is not here intended to depreciate the New Sys-  
 tem ;



tem ; it has founded a most beneficial era in the history of Agriculture ; it doubles and trebles the produce, and consequently the value, of meagre soils ; but it certainly requires more modification, as I have before hinted, to adapt it to the climature and the naturally grassy soils of Wales, as well as the West of England, where it will be found defective, as it is in many of its practices and principles ; and such defects are the occasions that some reject it totally ; that others, who tried it for many years, with a prepossession highly in its favour, found themselves at length obliged to relinquish it in many instances, and to recur to the old practice of the country."

" It is, moreover, a matter of fact, that failures are more common among the practitioners of the New System ; and the most certain and general success among the farmers of the Old School. This, however, cannot be urged as an argument in favour of the *Old*, and against the *New* ; it only proves that one system is more thoroughly understood than the other ; and it is one of the most common proverbial observations, that a man gets more money by a trade that he *knows*, than by another, in itself better, that he does *not know*. The principles of the Old System have been for ages so established, that all know them ; they have been transmitted traditionally from father to son ; all have been brought up in them ; but to most, the New System is an unknown region, that requires time and travel to become acquainted with all its parts, and few have perseverance enough to explore such regions."

" After all, as an imbecile advocate of the Old System upon its best principles, I am willing to come to a compromise with the advocates of the New ; so that possibly between both, we may form the best system of  
any,

any, for the climature of Wales. I would propose six or eight crops, three or four white, and the same number green, in regular alternations, and lay down in grass for as many years as crops, or for six or seven years after eight crops. But the period required for new leys to recover the properties of ancient pastures, has rather been conjectured than ascertained. We might imagine that it would be proper, after this had been attained, to avail ourselves of the benefit of old pastures, and not destroy them as soon as obtained. Whence an idea occurs, that five white crops and five green crops, in regular alternation, or ten in the whole, should be taken, and lay down for as many years as crops.

“ It would perhaps be premature, as a proper course of experiments may not have been tried, to point out the particular modification; but to adopt in part the cultivated grasses and alternations of the system of perpetual tillage, and to retain some things of the Old System of alternate tillage and pasture, which would constitute probably an essential part of such modification.

“ In all the branches of knowledge, in philosophy, politics, religion, &c., mankind run into extremes, one into this, the other into the reverse. Few understandings are capable of exploring the vast intermediate space between, wherein only truth and soundness of principle are to be found. But to become prepared to form that modification of the agricultural system, that may be found best adapted to the various circumstances of Wales, I would propose to collect all that can any where be found and known of the best principles and practices of the Old System, and to exhibit

exhibit their reasons, to scrutinize the weight of such reasons, with respect to what may be opposed to them in the New System, and thus form a selection and adaption of what may be found and conceived to be best calculated for the purpose, to form such a system as may be deemed effective. Having done this, subject it to proper experiments. Agricultural Societies might give premiums for the various experiments; thus in one year, on various farms, as great a number of experiments might be tried, as the Society might be able to afford of premiums."—J. P.

Before we received the above sketch, we were apprehensive that our friend J. P. was so much attached to the Old System, as exclude the New entirely from his calendar. Now we are glad to find he is no bigotsounding a parley, willing to come to terms of compromise, and to form between both a third system of mixed husbandry, which, as he himself observes, may eventually be found to be the best adapted to the grassy soils of humid climates.

It seems clear, that the Old System was not well calculated to answer the demands of an increased population, because it could not command within itself the increase of manure, which a greatly extended tillage upon the same principles, would have required. The green crops of the New System, had it in part been then adopted, would have supplied that increase of manure, which from straw crops, and especially where hay was foddered out in the fields where it grew, during winter, was utterly unattainable. On the other hand, a periodical return of tillage land into grass, is a principle of the Old System which should not be given up in the compromise, especially upon the West-Walian soils.

soils, which naturally run into a thick sward, in which they are very different from the meagre soils of drier countries, which, as soon as clover disappears, will have nothing left to cover their nakedness, and consequently require a constant recurrence to tillage, except the cultivated grasses be of the perennial kind.



#### SECT. IV.—CROPS COMMONLY CULTIVATED;

##### THEIR SEED, CULTURE, PRODUCE, &c.

THE crops most commonly cultivated, are those of *wheat*, *barley*, and *oats*. Their seed, culture, and produce, &c. have been somewhat fully detailed already, in the preceding Section on the Courses of Crops: we may, however, recur to the same topics, in a more strict observance of the plan prescribed by the Board; and go over each species of crops, arranging them in succession, either according to the extent of their cultivation, or in the order of their presumed superior usefulness to the grower and to the consumer.

#### I. WHEAT.

1. *Preparation, Tillage, Manure.*—The beds commonly allotted to this chief of British grains, are *furrows* of the several descriptions already enumerated; *leys* of clover and common pasture; *brushes* of pease, and in a few instances of beans, with occasionally, and perhaps too frequently, potatoe and turnip grounds. The beds themselves bespeak their respective tilths. The manures, in kind and quantity, depend upon the plenty or scarcity of the several articles which constitute the catalogue of them, as well as upon the fertility or comparative sterility of the soil.

In

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In the Vale of Glamorgan, and on some of the best soils elsewhere, crops of wheat have been obtained from old pastures, &c. without any manure whatever, save what naturally falls upon the field; and where the first crop has been procured from a full limed summer-fallow, followed by barley and clover, the next or second crop of wheat is frequently raised without any additional manure; the effect of the heavy liming being supposed still to operate. *Lime* also is the general manure for wheat in the new husbandry, being bestowed on the clover ley, &c. in order to reserve the dung for green crops. But by far the greater number, in most parts of the district, will not venture lime alone for a crop of wheat without dung, whether upon fallow or ley; and where convenient, on the western coasts, the spoils of the ocean, sea-sand and tang, are also added; and, in a few instances, ashes and marl. The aftermath or second crop of clover, permitted to grow till in blossom, then rolled, a sprinkling of lime added, and ploughed in, is considered in the Vale of Towy, Gower, and other places, as a sufficient preparation for a crop of wheat.

“Nothing pays better than a good growth of clover ploughed in for wheat; especially if half dressed with lime, it will then yield a crop of wheat superior to that from a summer-fallow, with larger ear and grain.”—*E. Morgan, Esq. Coal Tract.*

2. *Sorts.*—The earliest notice of *varieties* of wheat in this district, that we observed, is that of the Lord of Kemmaes, in his history of Pembrokeshire, about the conclusion of the sixteenth century. He says, “This country hath of winter wheat onely two sortes, that is, *bended* and *notted* wheat, as the husbandes terme them; the



the first having a bearde along the eare, the other having none, but is balde and smothe. This notted wheat is accompted the best and finest of both, and is most used in the hundreds of Castle Martin, Narberth, and partly in Rowce. There is a *third* kinde of wheat, not well knowne in other countreys, which is called *holly wheat*, or somer wheat; this is used in the Welshe partes of this sheere, as alsoe in Cardigansheere; and is sowed in the latter ende of March and beginning of April; and is a daintie graine like the barlie, and cannot endure to be pinched with colde. It is a very profitable graine, and yealdeth more increase than the winter wheat, and beareth a greate eare and stalke. The groundes that this graine must have must be well dunged and handled, or else it will not prosper. The only discommoditie of this corne is, it is long a ripening; so that if the harvest be not very timely, and the weather warme, it will hardlie be saved. The bread of this wheat is saide to be somewhat more browne in colour than the winter wheat; but in all other thinges equaleth the best sorte; and I have verie faire and white manchet made of this kinde of wheat, soe as no difference was to be found betweene it and the best winter wheat. This kinde of wheat is alsoe sowed in foldeland, and thriveth therein verie well with once plowing, and sowing it in the greate swarthe."

How far these three kinds resemble any of the several species of wheat now cultivated in Pembrokeshire, or any other part of South Wales, may appear from the following list.

1. *Red Wheat*, called in most places Red Lammas, from its presumed earliness in ripening the beginning of August, is the most commonly cultivated of any, in

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every

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every part of the district, excepting the Vale of Glamorgan.

2. *White Wheat*, called for the above reason, *White Lammas*, is to be met with occasionally in every part of the district; but in none so universally common as in the extensive Vale of Glamorgan, where it is grown to an exceeding great amount. Farmers from other countries, coming to reside in this Vale, and either from prepossession or experience, persuaded of the superiority of the red wheat, introduced it upon their farms; but they soon found that they could not dispose of it in the home-markets; as no one would buy red wheat as long as the white was to be had at the same price. This predilection in the choice of a whole country soon forced the red wheat growers, to change the species in compliance with the public taste. This at first might tempt us to suppose that white Lammas is really superior to the red. Among farmers in every other part of the district, the opinion is pretty general, that red Lammas is hardier than the white in exposed situations, on severe winters or springs; that the crops upon an average are more productive; that the sample is of superior weight at the mill: farmers also agree in general upon a subject of considerable importance, that it is less subject to the smut than the white. These are sufficient reasons, if well founded, for its being more generally sown in every part, as before mentioned, than any other species. Indeed it may be presumed, that white Lammas, and some other varieties, are sowed by several, more out of a desire of *change*, than any conviction of their being superior to the red. The preference given to the white in the Vale of Glamorgan, seems to be almost exclusively on the side of the consumers, and  
not

not the growers; and their respective interests in this particular appear to be at variance. This may be accounted for, by the general fare of the peasantry. Most countries have some peculiarity in their diet, in which they differ from others. The Welsh, uncontaminated by foreign practices or customs, are generally Braminical in their diet. Bread, milk, cheese, butter, and vegetables, form the major part of their bill of fare. Even in the manufacture of bread, counties differ widely. The mountaineers have good reasons for preferring the cultivation of oats, as well as the bread made of that grain. Such is the force of habit, that the peasantry of the barley tracts prefer bread made of it, to others that are considered superior in flavour by those who judge of other persons' palates by their own. In the Vale of Glamorgan, there is very little bread consumed but what is made from pure wheat, excepting in seasons of scarcity, such as those of the years 1800 and 1811, when the square eared barley grown in the western counties is imported and bought by the poorer peasantry. In common years the white Lammas wheat is *ground down*, as the millers term it; and the three parts of the grain, the outer coat, the inner coat, and the meal of farina, all three indiscriminately enter into the composition of common family bread. This accounts for the general preference given by the bulk of consumers to the white Lammas: bread made by a similar process from the red Lammas could not be at best so grateful to the eye, an organ of great influence in biassing the mind. There is a commendable economy in this mode of *grinding down* good wheat for common family bread, especially in years of scarcity; but no stigma can be attached to it at any time. It is well known, and some intelligent and experimental pamphlets were published on the sub-

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ject during the dearth of 1800, that the inner coat situated between the bran and the fine meal, contains by far the greatest quantity of vegetable gluten, and consequently the greatest share of nutritious aliment; which never enters, saving in a small degree, into the fine bread made from the separated farina of the bolting mills.

3. Some *new varieties* of wheat are now and then introduced by experimentalists; generally with a view of changing seed; but after the first year, when a comfortable bed is commonly provided for the stranger, they are not found superior, if equal, to the two foregoing species of Lammas. The new varieties are generally puffed up with an additional cognomen from the names of the places they are supposed to be introduced from.

4. *Mixed Wheat.* Such farmers as do not think the periodical change of seed necessary, have commonly in their fields a mixture of several varieties of wheat: two or three varieties of smooth-eared, and as many of bearded wheat; and of both various shades of yellowish, brown, and white; in the colours of the ears, grain, &c. One variety, bearded, white eared, with yellowish, brown grain, resembles the modern bearded spring wheat; and differs from it mostly in being able to bear the winter, and in ripening regularly with its autumn-sown comrades.

It would seem to be worth the farmer's trouble, and little expense, to get rid of these *mixed* crops: though they apparently grow and ripen together, yet they originate from different stocks, and from different soils; and perhaps in the season of flowering, may assist in degenerating each other still more: and, moreover, they can never produce samples equally marketable with those

those of pure red or white Lammas in their separate state; nor produce so much meal from the grain, weight for weight.

5. *Spring Wheat.* This was at its first annunciation branded with being only the "puff of a quack." It is now, however, proved to answer its peculiarity of ripening betimes, when sown so late as the beginning of May; which no other known wheat will do. Sir Edward Hamilton has discontinued the cultivation of the smooth-eared, and substituted in its stead the bearded kind, which he finds hardier in untoward springs.

In the Vale of Glamorgan, the white Lammas is frequently sowed after turnips in March, and succeeds well. Mr. M. Spencer of St. Athan, in 1810, had autumn-sown white Lammas, and the real spring wheat in the same field: the former became mildewed, the latter escaped, and was an excellent crop. The rean or furrow which divided the autumn and spring-sown crops, divided also to a hair's breadth the healthy from the diseased.

This seems to confirm the opinion, that *mildew* is owing to sudden transitions in the air from heat to cold, during the delicate crisis of the wheat being in blossom, or thereabouts. (See North Wales, p. 188.) Could the autumn-sown wheat be in a fit state to be affected by such transitions of the weather, whilst the spring-sown wheat was not, by coming a fortnight or more later into blossom?—Or could the spring ploughing and tillage have disturbed the growth, or rather the embryo cause, of Sir Joseph Banks's parasitical plants, which was not the case with the autumn-sown wheat? If the latter can be thought a preventive of mildew; would not spring harrowing, and afterwards rolling the autumn-sown plants, be of essential service? which



is a practice hereafter to be noticed, under "*Culture whilst growing.*" But an objection may be urged against the latter hypothesis, that the parasitical plants, if such there be, have an instantaneous origin common to the tribe of *fungi*, during a warm and moist June, or July.

But to return to Mr. Spencer: He was so well satisfied with his spring wheat of 1810, that in 1811 he sowed 15 acres with it, after turnips.

The writer of this article sowed his first year's spring wheat about the middle of March; and a few nights frost the latter end of April, snapped off about half the plants in the exposed part of the field. The ridges next the fences, screened from the north and east, bore an excellent full crop. The plants on the exposed part recovered considerably, by tillering, &c. so that in some instances there were six stalks upon the same root. The produce at harvest gave nine returns\*. This was upon vale land, the soil a gravelly loam. Part of this crop was sowed the following spring (April 16th) upon hilly land, of a hazel mould soil. The crop, from thicker sowing, &c., trebled the former one in straw; but the produce of grain became reduced in the proportion of seven bushels to nine. The third year it was tried upon a still poorer soil, a hungry clay; the produce of course still smaller, and was, moreover, for the first time smutty†. The three crops were after turnips; the two

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\* A neighbour, the following year, succeeded better: he had 48 bushels from four, sown in March, on ferny soil, sideland, with a southern aspect.

† In 1812, most of the spring wheat crops in the same neighbourhood were smutted, more or less. Farmers attribute it to want of pickling the seed, which in future they intend to do. May and June 1812, were very wet.

latter had been manured for turnips with lime and dung, the former with dung only; and all three had clover and other seeds sown at the same time, to be laid down; the grasses each time excellent, even upon the poorer soils.

From these and other observations elsewhere, spring wheat seems well adapted to succeed turnips, to be sowed from the middle of April to the first week in May, according to circumstances, upon soils *not below mediocrity*. It also seems superior to any other crop for promoting the luxuriant growth of clover, &c. sown with it: but upon the inferior soils, even after a manured turnip crop, oats must be much more profitable. Owing to its being tried on poor soils, not well manured, and perhaps other causes, it is, however, getting out of credit. Valuers of crops, tithes, &c. do not, upon an average, set a higher price upon it, per acre, than a middling crop of oats. Its straw is the poorest of any that is grown, not excepting even barley straw. We however observed in one bearded crop, just before harvest, a few stems here and there of a most beautiful wheat, in straw, ear, and grain: the ear white and smooth; the straw had a pearly gloss; the grain of the first sample, and of a colour between the red and white Lammas. We would be obliged by information where a spring wheat of this description is to be had.

Our present spring wheat resembles the *holy* or summer wheat mentioned by the ancient Historian of Pembrokeshire, in being "a daintie graine, that cannot endure to be pinched with colde\*;" but is very different

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\* Several instances occurred to us, of the delicacy of spring wheat; and only *one* of its ability to stand the winter. It being customary with

different from it as to the length of its continuance in the ground. The *holy wheat*, though sown in March or beginning of April, did not ripen till late in the harvest season; whereas the present spring wheat, though sown the 1st of May, will ripen within about nine days of barley sown the same day in the same field; at least it has done so in one instance under observation, upon hazel mould upland situation, upon turnip ground well manured.

The "*holy wheat*\*" is said to have been given up in Pembrokeshire pretty long ago, owing to its ripening so late; but the "*notted and bended*" kinds of the same author may still be traced in the grain called "*gwenith y wlad*" (the country wheat) in the uplands. The *notted* seems to be a degenerated red Lammas, and the *bended* a degenerated cone-wheat; for the most part sown singly, though sometimes mixed. However, many farmers in the western and northern parts of the county, procure the best samples of modern red Lammas and cone-wheat for seed: and in the hundreds of Castle Martin, Narberth, and Rowse, the farmers can boast wheat of superior quality; especially on the stronger soils of the red-rab and limestone of Castle Martin, where good samples of red Lammas have a degree of transparency seldom equalled.

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some to sow cone-wheat in the headlands, to cheat the sparrows; a farmer, for want of cone-wheat, sowed the sides and headlands round a large field, in the autumn of 1811, with spring wheat; and, whether owing to the shelter of fences, or other cause, it stood the winter; and was harvested, thrashed, and sent to market, during the unexampled dearth, before the red Lammas in the same field was nearly ripe.

\* *Gwenith bendigaid*, by the Welsh; literally, *blessed wheat*. The square eared barley has also been called, in the west of Pembrokeshire, *bendigaid*, blessed barley; terms apparently of Monkish origin.

*S. Steeping.*

3. *Steeping*—is a subject, the more it is considered, the more it seems to be involved in intricacy and litigation; though a practice of at least two thousand years standing. Virgil had seen many farmers dress the seed with a preparation of nitre and a black oleaginous liquid (perhaps the juice of the dunghill) in order that the produce might better fill the ears or pods; and, by invigorating the vegetating principle, decay and disease might be prevented. The practice may have been transported into Britain with the Roman husbandry, during the reign of the Cæsars. It may afterwards have been discontinued, with many other practices, whether useful or not, from the irruption of the northern hordes, until the restoration of literature after the invention of printing; when the Italian writers on agriculture became more generally known. Steeping was, however, almost universally considered as beneficial in preventing diseases in general, without enquiring into causes, or discriminating in the least between one disease and another. Duhamel seems to have been one of the first who had vigour of mind sufficient to see and to expose the inutility of the practice, as far as it was considered as invigorating the principle of vegetation, in all its stages, from the birth of the infant plant to its complete maturity. Hence arose a sect of agricultural sceptics, who decried *steeping* in general; and they have succeeded so far as to browbeat the superstitious part of it out of countenance; namely, that it acted as a specific general, and was equally preventive of *blight* or *mildew*, as it was efficacious against *smut*. This whetted the ridicule of the witty, and caused the thinking part of farmers to reflect, that (according to Mr. Wimpey) “a man may as well chant an *abracadabra* over his corn fields;” or (according to Mr. Lawrence) that he “may  
as



as well apply to Dr. Solomon, or any other Doctor of equal celebrity, for a potion to be taken at Gunpowder Treason, in order to cure him of a cold which may possibly attack him the Midsummer next ensuing; as steep his corn in autumn, in the most celebrated nostrum, with a view of preserving the future crop from *blight* or *mildew*." We have presumed to substitute *Midsummer* for Mr. Lawrence's *Michaelmas*; and *blight* or *mildew* for his *smut*; the former to make the similitude more perfect, and the latter for reasons hereafter to be explained.

4. *Diseases of Wheat—Blight—Mildew—Smut.*—*Blight* is called in some parts of Wales *malldod* or *mallder*; signifying a corrupted state, devoidness of energy, &c., and is supposed to be occasioned by certain noxious qualities in the air. Early sowing has been recommended as a preventive; that the corn may have attained betimes a state of maturity, so as to be able, by its organic construction, to withstand the blighting agent. This might be of service, were we certain what day of the month the blasting cause would visit our fields. Instances have occurred, and one has been noticed in a former place, of March-sown wheat escaping the mildew, whilst the autumn-sown wheat in the same field was much injured by it.

The editors of Dr. Rees's New Cyclopædia confine their observations on *blight*, almost exclusively to that on fruit trees; and inform us at the conclusion of the article, that "*blight* in corn is called *smut*;" which is a plain indication that these gentlemen consider *blight* and *smut* as synonymous terms; whereas, in the opinion of practical farmers, they are maladies very different in their appearances, and may be so in their causes.

*Blighted*



*Blighted* wheat in leaf is generally of too pale a green; and the ears and straw turn prematurely, and somewhat suddenly, of a paler hue than those of sound grain: *smutted* wheat, on the contrary, has its leaves commonly of a strong dingy green. Owing to the comparative lightness of the ears, in both cases, the stalks in each stand more erect than those of sound corn, especially at the approach of harvest: but *smutted* stalks are generally shorter than the *blighted*; being commonly shorter by the ears' length at least, than the sound wheat with which it is intermixed: and exclusively of erectness and comparative shortness of stem, it may easily be known by a difference of colour in the ear. When the sound ears, in approaching maturity, assume their respective natural colours, the *smutty* ears continue for some time of a dull green, somewhat variegated with a blueish drab colour, and then turn of a pale sickly hue. *Blighted* crops have occasionally tillered in the usual way; owing, apparently, to their having undergone the customary progressions of vegetation until they were checked by the attack; but *smutty* ears are commonly on single stalks, sometimes two or three, but rarely above four; and those in general also in the same state. *Blighted* ears contain more or less, a few shrivelled grain, yielding white farina or meal; but *smutty* ears are always full of black stinking dust.

The most striking distinction between *blight* and *smut*, is in the generality of the one, and the partiality of the other in their infection of crops. *Blight*, and especially mildew, in certain seasons, pervades a whole country, vales, or mountainous tracts, without respect of soils or treatment; whereas *smut*-balls are but here and there, amidst other apparently sound ears. The proportion

proportion of smutty ears in a crop is very various; probably according to the state or progress of infection. In some instances it has been rated at *one-half*: this is too high, and means no more than a great proportion: one-fourth is an uncommon failure; and so on, the proportion diminishing to one in six, one in ten, in a hundred, or even in ten thousand, &c. Some knowing men give it as their opinion, that *blight* is not owing to any latent noxious quality in the air, or lightning; but to this, that, or the other; especially the insects called *aphides*: that may be, with respect to fruit trees; but in blighted corn we have witnessed appearances, which might be attributed to some agency like that of electricity rather than any other. It sometimes affects whole fields; sometimes only part of a field: the line of division, between the sound and infected parts, sometimes running in the direction of the ridges, sometimes across; and at others diagonally from one corner to another. Sometimes the line is direct; at other times meandering or angular; and this in a field similar in soil, aspect, manure, seed, and every treatment, in every part.

*Smut* is called in Welsh, *penddu*: *Gwenith penddu*, black-tipped wheat.

*Mildew* is commonly termed *y gawod*, the shower; a thing general in its effect. This term is in allusion to the *mél-gawod*, the honey shower, or dew so called; which when farmers observe to be copious on the leaves of trees and plants, in June or July, they become apprehensive of the health of their grain that year; though without foundation; as the *mél-gawod*, honey-dew, seems to be satisfactorily proved by naturalists to be nothing else than a kind of saccharine liquid issuing from the numerous tribe of insects called plant-lice (*aphides*)



(*aphides*) in Welsh, *uyseu-lau*: honey-dew, then, is never to be found on wheat, unless on a few plants under the cover of trees infested with the insects.

Some writers say, that the *aphides* sometimes infest crops of corn, and may occasion blight; but is it not more natural, and consonant to the history of the generation of that tribe, to confine them to perennial trees, shrubs, and plants? However, red insects are found commonly in mildewed ears, and microscopic observations make smut-balls *all alive*. Insects have also occasionally been found on blighted ears: but probably these insects are more the effect 'than the cause of the disease.

The difference between a blighted and a mildewed crop, appears in the straw; that of the former being throughout of a pale colour, without gloss, and uniformly brittle; that of the latter being, more or less, commonly invested with *rust*, by which term it is called in many parts of England; and a joint happening to be without rust, preserves in some degree its gloss and toughness; and the grain in the ears seldom suffer so much from mildew as from blight. Some blighted crops are little better than straw. The average of a mildewed crop may be about one-third of that of a customary produce from a similar crop when sound; and from one-half to three-fourths of its weight, measure for measure.

There may be pre-disposing secondary causes, rendering crops more liable to be infected. Crops are frequently lighter, or blighted, in small inclosures, in northern aspects, adjoining woods, &c. Dunged crops of wheat are generally more subject to smut, if not to mildew, than limed crops: hence an essential point gained by the New Husbandry; in liming for wheat, and  
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ding only for green crops. The inferences we would fain draw from some effects, are subversive of those which by any thing like sound reasoning we can infer from others. In the year 1804, mildew was very common; and such as had to buy corn in 1805, remember it well: wheat sown alone in a certain field was much injured, whilst in the same field, under similar circumstances, wheat sown among rye was not in the least affected. From this we would fain imagine, that as rye is not subject to mildew, it preserved the wheat by its shelter, being commonly half a foot taller: but when we see sheltered wheat in small inclosures, and near woods, more infected than wheat in open fields, we hesitate.

Rye is reported to be more subject to blight than wheat; and wheat more liable to mildew and smut than rye. In the tract of country with which we are best acquainted, rye is seldom sown but on the ashes of a pared and burned fresh soil, where it is seldom affected with any malady. Sometimes, on poor soils, in wet and late seasons, a grain or two, seldom above four, in some ears, are converted into a black gummy substance, but resembling smut in no respect, save colour.

Having so far expatiated on the various effects of *blight* and *mildew*, we cannot help joining those who attribute them to external causes, arising from peculiar qualities in the air or weather; against which no human Precautions can avail. Tilling well, manuring judiciously, and committing sound seed to the ground in the most approved seasons, is all we can do; leaving the rest to Providence: and if, after all, blight or mildew attack our crops, resignation is our proper sphere.

With respect to the cause of *smut*, we pause, and hesitate.

hesitate to class it with the two former maladies: and that not so much from any conviction of our own, as out of compliment to the opinion of many enlightened agriculturists, and of nearly the whole class of the hereditary practical farmers.

Smut, they say, is a constitutional degeneracy in the seed; a radical or hereditary disease; like the scrofula and other maladies in the human system; where we find that the effects from a vitiated parent do not commonly appear in the whole of the offspring; but on the contrary, one or two in ten may be affected; sometimes the whole of that generation escapes, and the dormant virus does not re-appear until the second, third, or even the fourth descent.

Whether living animalculæ exist in smut-balls or not, the case may be the same, if there be virus of any kind, dead or alive, attached to the seed, and sufficient to communicate its effects to the plants which grow out of them, so as to produce smut-bearing instead of grain-bearing stems. The animalculæ or dust, when separated by the flail\*, attach themselves to the downy substance at the germinating end of each grain.

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\* In thrashing and winnowing machines united, the movements are so rapid, that when a smutted crop is in thrashing, whilst the black dust, rendered volatile by the agitation, is kept hovering aloft, the grain may be secured in bags, without being nearly so much damaged as it would have been by the slower operation of the flail. By either method, a summer thrashing of smutted crops is to be preferred. The dust is then more volatile, more inclined to ascend than descend; and attaches itself to the roof of the building, to the nostrils and eyebrows of the thrasher, rather than to the downy ends of the grain, now also less capable of retaining any dust. All precautions of the kind are useful; as bread made of smutted wheat is both unpleasant and unwholesome.

In some instances, the smutted or "branded" ears have been found



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To the naked eye, every smutted grain seems equally loaded with the morbid matter; and yet, were they all sowed in that state, it does not follow, at least it has not yet commonly appeared, that they would all produce smut-balls: on the contrary, the major part, more or less, would produce apparently healthy ears. This may be hypothetically accounted for, by supposing that the morbid matter had been neutralized, or altogether removed from the major part, by some counteracting agent or other, either before the seed was sown, or during its lodgement in the soil, before germination had made much progress. The first appearance of smut, from seed apparently sound, may be accounted for by supposing that the grains which produced it (from the same ears very probably) were already in an incipient declining state, and may have been gradually approximating it for generations back, though not visibly to our senses until the crisis of the disease. If such incipient disease reduces the weight of the infected grain, we see the use of *steeping* in liquids, and skimming off the swimmers; and consequently the propriety of not sowing wheat but of a given standard weight, proportioned to the customary produce of each tract respectively. But without numerous experiments, made in all parts of the kingdom by the ablest hands, and periodical communications from all parts to the throne of Ceres;—we must continue in the dark, and be perpetually subject to error: for who knows, after recommending the plumpest grain for seed, but that the shrivelled grain of blighted

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to have passed through the thrashing machine unbroken, even early in winter; though at the same time the sound grain had been thrashed out cleaner than is usually done by the flail.

crops,

pa, such as would not weigh above 44lb. to a  
 bel, would produce crops in succession, without  
 least taint, or even being liable to smut; for the  
 piency of smuttiness, and its cause, may have been  
 ed or destroyed by the very aerial agent which  
 sed the blight!—This may be nonsense; but there  
 great deal more abroad.

Experiments on smut should be made on small, but  
 y numerous scales: sound grain artificially infected  
 contact; grain naturally infected; a moiety pic-  
 l, the other not; should be severally sowed; ve-  
 ble anatomy should be resorted to in every stage of  
 growth of the plants, and the appearances in each  
 utely noted; so as to observe the progress of the  
 asc, if radical; and the period of attack, if casual.  
 Were the few smutty ears that first appear as symp-  
 s of degeneracy in the seed, carefully picked out  
 out infecting the rest; and the remaining appa-  
 ly sound grain sowed the following year, a moiety  
 led, the other not;—would the number of smutty  
 in the latter be increased more than in the former?  
 if so, by repeating the experiment from year to  
 , would the crop at last consist only of smut balls?  
 ay of the intermediate crops turn out sound, with-  
 the customary precaution of pickling, would it  
 be considered as a presumptive proof that smut is  
 owing to a radical disease? except the disease be  
 ved to be of the intermittent kind.

be current stated facts respecting smut are very  
 us, and in some instances contradictory of each  
 : this shews the expediency of some such experi-  
 s as are above recommended. Parties run nearly  
 gb upon this subject as upon politics; and they  
 occasionally with as little candour in the one  
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case as the other. To doubt the accuracy of experiments, because they make against a particular practice or theory, is not fair, nor the way to come at the truth.

5.—*Steeping, washing, brining\*, pickling, &c.*

\* *Jethro Tull on Brining, Smut, Blight, &c.*—“*Brining* seed to prevent smut, was first practised about 70 years ago (*about* 1660). A vessel laden with wheat was sunk near Bristol; and the wheat, at ebbs, all taken up. Not being fit for bread, and farmers, finding it would vegetate, bought it by small quantities; and it was all sowed in different parts. At the following harvest, all the wheat in England happened to be smutty, excepting from this brined ship-wrecked seed: and this accident led to the very general practice of brining.

“Smutty seed, though brined, will produce a smutty crop, unless the year prove favourable. Favourable years will cure the smut, as unkind ones will cause it. Otherwise in very bad years, as that just mentioned, they must have bought seed from abroad; or they would never have had sound wheat.

“Blight affects wheat in two seasons; 1st, when in blossom, its generation is prevented, and many husks are empty: 2dly, when the grain is nearer maturity, and rendered light, and of little value for bread. It is owing to long continued rains, that rot or chill affect the blossoms, and prevent fertility. Open countries are more free from it than those more confined; and Lammas wheat is not so liable to it as the bearded wheat, which received very great damage from this sort of blight in the year 1725; the like never having been heard of before; I hope it may never happen again. The latter blight, when the grain is nearer maturity, is the most frequent and general, and brings the greatest scarcity of wheat. The cause is plainly want of nourishment, by whatever means that want is occasioned. Lightning is observed to cause blight; so also lodging; but what causes lodging? weakness of constitution, want of nourishment, &c. Another cause is coming too late into blossom; hence the earlier sown wheat, escape blights best.”

All the wheat in England smutted the same year, is scarcely to be credited; but if Tull believed it, as it seems he did, it is no wonder that he attributes the cause to cold wet summers. That general causes produce general effects, as in blight or mildew, may be easily conceived; but how such general causes, in the air or weather, select an ear or stem here and there in crops of wheat, so as to produce smut, is not so apparent. General causes, however, may affect plants that are pre-disposed to smut by incipient degeneracy.

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are various processes intended to medicate seed wheat against the *smut*; and may be separated into two classes:—

1. When infected wheat, already visibly smutted, is treated.

2. When wheat apparently sound (and no wheat is above that predicament) is treated in a similar way.

In the first case, if the crop growing therefrom is apparently sound, the medicament must be of acknowledged utility; and may be termed the *cure* of smut.

In the latter case, it is at best but doubtful; and the *prevention* of smut is an improper, though a very common, expression: for before a thing, smut or any thing, can be said to have been prevented, it should first be proved that *that* thing would have existed, had it not been prevented; which, in the case of pickling apparently sound wheat (though that wheat produces again a sound crop) is impossible: it is at best, until a further discovery be made, but a *precaution*, not strictly a prevention.

We are far, however, from decrying the practice, though it cannot be proved to have been founded on rational principles. It is however of long standing, among the most rational of farmers, who would not continue the practice without their having a strong persuasion of its utility; though they cannot account, in both cases, which way it operates.

These wild and perhaps incoherent remarks, though they as yet lead to no immediate conclusion, may nevertheless serve to throw some light upon a subject of acknowledged intricacy.

In this district, like most others in the kingdom, those who use no preparation of seed wheat at all, are comparatively very few; and in general greater readers

than farmers. One farmer gave his reason for not pickling, in these words—"One year I was tempted to purchase a '*never failing pickle*,' which was advertised in a newspaper (a fruitful source) which I applied in the prescribed way to a '*famous seed wheat*' which I bought at an extravagant price: the crop however turned out very smutty. I repeated the experiment three years running, and notwithstanding changing seed and pickling every year, the three crops were successively smutty. I then thought it high time to change my practice; and have discontinued pickling these six years; and my crops have been clear of smut, excepting a few ears which appeared one year."—*W. O.*

"A gentleman in Brecknockshire having all his wheat smutted, purchased recommended seed from a distance, and had it pickled in the usual way with urine and lime. The purchased wheat not covering the land, the bailiff had orders to finish with the home-smutted wheat, unpickled; and, contrary to general expectation, and somewhat to the confusion of theory, the crop of the former wheat turned out smutted, and that of the latter, sound grain."—*J. D.*

Such instances tend to prolong the contest on the utility of pickling. But it must be allowed, that instances on the other side are much the most numerous. A field sowed with pickled wheat, yielding a sound crop; whilst the headlands, sowed with the same wheat, unpickled, turn out smutty, is not an uncommon case.

We are willing to place the above statements, striking as they are, in the chapter of accidents. Advertised nostrums, especially those for premiums, generally carry with them their own condemnation. The poisonous ingredients, blue and green vitriol, arsenic,  
and



and corrosive sublimate; as well as a hodge-podge mixture of all the salts in a druggist's shop, excepting those of Glauber and Epsom; are too fanciful quackeries to have a long run. The poisons, it seems, were intended to make sure of killing the animalculæ, or the virus of smut; but when applied to wheat apparently sound, is it not premature? The poison has no visible enemy to encounter; and simpler methods of precaution must be much more recommendable; were it only for their being cheaper and safer.

With some, washing with pure water is thought equal to the effect intended by the most compound pickles. Some, lying convenient, use sea water: others, more inland, make a brine of salt and water, until it be strong enough to bear an egg. With some, powdered wormwood (*artemisia absinthiam*) in stale urine, is considered as a never-failing specific for the smut.

The most general pickle in this district, as well as in most other parts of the island, is that made of urine and lime. It is recommended, and practised by some, to steep the wheat in stale urine (chamber lye) from five to eight minutes, and then dry it with lime: but the most common method is to lay the wheat in a heap upon an even floor; to form a cavity on the crown of the heap, and therein to pour the preparation or mixture of stale urine and slaked lime; working the heap immediately with a shovel; adding more grout or mixture until each grain has a white coat; and lastly, to dry the whole, fit for sowing, with riddled lime. The quantity thus pickled in the morning ought to be sowed in the course of the day; or, if any remain, it ought to be spread thin upon a floor. Instances have occurred, of inexperienced farmers having left wheat, pickled as above, to stand over night in a heap; and

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“ Some have thought that a large grain of wheat would produce a larger plant than a smaller grain; but I have full experience to the contrary. The small grain indeed sends up its first single blade in proportion to its own bulk; but afterwards becomes as large a plant as the largest grain can produce, *cæteris paribus*.”—*Jethro Tull*.

7. *Change*.—Persons who gravely recommend the steeping of seed in “solutions of arsenic,” and in the strainings of the farm-yard, “especially that coming from pig-styes;” yet attempt to ridicule the practice of *changing seed*. May the strainings of pig-styes save them the expense of soap and saltpetre in their pickles; and may their arsenicated grain poison their vermin instead of their fowls; but let them permit others to continue a rational practice, found to be useful by long experience.

On this subject we need not quote higher authority than the experimental philosopher, *Jethro Tull*.

“ *Change of Seed*, and brining, the two preventives of *smut*; the former of the two more certain. A gentleman assured me, that since he found out a place that affords a *change* proper for his land, he never had smutty grain; though he never used brine or lime; and even in years when the neighbouring crops, brined and limed, were smutty. The person who furnished him with seed, was himself curious in changing his seed every year.”

“ Wheat from strong clayey land thought best from white clay to red clay, and *vice versa*.

“ Flax seed brought from Holland, and sowed here will bring as fine flax as there; but the very next generation of it coarser; and so degenerating gradually after

after two or three descents, becomes no better than the common ordinary sort; yet its food is the same when the flax is fine as when it is coarse."

So it is when individuals of wheat are changed.

"Putney barley, in Wiltshire, growing in a dry sand, will for many years after, if sown on indifferent warm ground, be ripe two or three weeks sooner than any other, which has never been impregate at Putney: but if sown a degree farther north, in cold clayey land, will, in two or three years, lose this quality, and become as late ripe as any other."

"Indeed Putney is far from improving the species of barley; excepting by rendering it more weak, tender, and shorter lived; which fits it for such countries where the summers are too short for other barley to ripen."

"Every species of vegetable, whether plants or shrubs, &c., that are not indigenous, gradually degenerate, more or less, without *change of seed* and *culture*."—*Jeth. Tull*, p. 115, 2d edit.

None of our cultivated grains are indigenous. They must have been brought originally from soils and climates peculiarly suited to the natural continuation of their respective species. We have great varieties of soils, and a few of climates in this island; and those which approach nearest (however distant) to the qualities of the respective originals, may be presumed to produce, in the greatest perfection of originality, the respective grains.

Experience proves, since the days of Tull, that barley seed, from light early soils, ripens earlier on stronger soils, than that which has been grown thereon for a succession of years: and owing to its ripening earlier, during the best weather upon an average of seasons,

sons, it is consequently thinner rinded, and contains more saccharine matter for malt and brewing. For these reasons, the barley of the maritime coasts of Cardiganshire and Pembrokeshire, on light soils favourable to its growth, is bought for seed into parts of different soils and climature; and with advantage, otherwise the practice would be discontinued.

Wheat seems to have been originally brought from much colder soils than barley. And, as Tull observes of the soil of Putney, that it is far from improving the sample of barley in itself; as it only prepares it to succeed better in other soils: so wheat grown upon meagre clays, produces a similar meagre grain; but the *purity* of the sample is astonishingly preserved; and when sown from thence upon warm loams, it produces the finest plump grain; though but for a few years only without degenerating. Of this there is a striking instance in a small red wheat growing on the cold clays of the coal tract of Staffordshire and Warwickshire; which, when sown on the good loams of the neighbouring districts, produces wheat much superior, in purity of sample, to that which has been grown repeatedly upon those good soils.

South Wales is not disadvantageously circumstanced for changing of seed, within itself; owing to the regular position of the diversity of its soils. The Vale of Glamorgan has at least three varieties of soil upon limestone; exclusive of the gravelly loam of the eastern part of the county; and the happy admixture of alluvial substances with its own native limestone loam in the Vale of Ely, or *Bro Miskin*. The barley of the light brown loam of the white limestone tract, would suit the stronger grey loams of the lias limestone tracts; and the wheat of the latter may be well adapted to the soil



soil of the former. The white limestone tract of Gower adjoins the coal tract; and the limestone tract of Castle Martin in Pembrokeshire is similarly situated; with an intermediate adventitious intruder in the red rab soil, both south and north of Pembroke. The cold soils of the coal tract lie, the whole extent of South Wales, between calcareous soils on the south, and red soil of varieties of loams on the north. The red tract has within itself three or four varieties of soil, from a moderately light sandy loam to a stiff clay; exclusively of a greater variety of climature than any of the other tracts. The slate tract is the most inconvenient for this kind of traffic in seed; owing to its great extent, and comparative want of variety: it has, however, red soil the whole length of the district to the south; the early barley soils on the maritime coast to the west; adventitious tracts of marl, some on the surface; with cold soils on the hills, and warm soils in the hollows, whether vale, or valleys, throughout.

Red Lammas wheat, with the view of *change*, is introduced from the chalky soils of Wiltshire, &c. into parts of most of the counties.

White Lammas has formerly been in greater request, from Devon and Somerset, in the Vale of Glamorgan, than it is at present; as the *smut* is now considered by some as a *Damnonian* disease, introduced by the traffic.

Wheat is bought from the strong red soil, adjoining the middle limestone range, south-east of the Vale of Towy; to be sowed in the lighter grey soil of the shale tract, on the north-west of the Vale of Towy: and barley is also bought into this same part of the shale tract from a kindlier barley soil, and a drier climature, on the New Castle Emlyn side of the Teivy.

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The barley of the maritime coast of the counties of Cardigan and Pembroke has been already noticed, and being in great request for seed into the colder soils of more interior parts. The eastern parts of the counties of Radnor and Brecon, occasionally traffic for seed with the adjoining counties of Salop, Hereford, and Monmouth.

8. *Quantity sown.*—It may be proper here to premise, that *broadcast* is the general method of sowing. *Drilling* has been, and is still, practised by a few experimentalists here and there; who calculated much upon the great saving of seed: but the almost unquerable tendency of the land to run into grass, in many parts, especially the western and southern, is said to have more than counterbalanced the advantages.

A gentleman farmer, on the eastern borders of Wales, where the climate is less humid, and the soil a gravelly loam, favourable for drilling, constructed a machine upon an improved plan, and drilled most of his crops. He one year drilled his wheat, in rows one foot distant, allowed 49lb. seed to the acre, and the produce was about 38 returns, or 30 bushels per acre.

The quantity of *wheat*, &c. sown broadcast, varies according to circumstances. Good soils, in the vales of East Radnor, Wye, &c. in a proper state of tillage, and timely sown, are found to require no more than about 15 gallons per acre; and so on, the quantity increasing in proportion as the soils become poorer in ascending the hills, or the tillage more neglected, or the time of sowing more unseasonable. In free-working soils, in mountainous valleys, from 18 to 19 gallons

lons is found sufficient, "and better than more, upon this land." (*Llanddewi'r Cwm*, near the town of Buallt). However, owing to custom, or prevailing opinion, three bushels (24 gallons) is the average quantity upon the best lands in the Vales of Glamorgan, Towy, Teivy, in Castle Martin, and Gower. This is the quantity of such as calculate by the Winchester measure; according to provincial measures, two and a half customary bushels of 40 quarts each (25 gallons) is the most general quantity, upon an average of the whole district, without varying in many instances as much as may be thought proper. This quantity increases, according to the governing circumstances above stated, to 30 and 32 gallons, or three and three-quarters and four bushels; which is the greatest quantity we have heard of; being just double the smallest quantity.

When a farmer sows a quantity of seed comparatively small, upon a good soil, "in good heart," as he terms it, he depends for a full crop upon *tillering*; which takes place in proportion to the natural quality, and the artificial state of the soil: hence varieties of quantities of seed become necessary in proportion to those circumstances. A crop on poor soil will not *tiller*\*

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\* Crops on poor soils commonly consist of one, two, three, seldom above four stems on a root: on good soils, ten and twelve are common. Haughton, who seems to have delighted in the marvellous, relates his having seen 80 stems to a root of wheat, and 50 grains to each ear; which is a return of 4000 for one. Tull talks of from 20 to 40 on ordinary field land. The greatest tillering that we have witnessed, in the broadcast, was 28 in rye; 36 in oats, on Castle Martin Corse; 20 in wheat, at Llwyndyrus, on the Teivy; and 10 common in a crop of wheat upon fresh land, pared and burned, without any manure but the ashes. We have heard of 50 to a root of white Lammas, in the Vale of Glamorgan.

but in a very small proportion to that on good soil; exhausted soils are commonly full of weeds, and thin sown crops will have the less chance of standing their ground among them: the latest sown crops require an additional quantity of seed, "some for the crows," some to be destroyed by severity of weather, at its very vegetation; or to be spewed up by frosts, &c. These circumstances always require additional quantities. The ridicule of comparing thick sowing upon poor soils under adverse circumstances, to the laying of the heavier weight upon the weaker horse, is totally void of effect. The great error lies in keeping too many weak and superannuated horses, which are not able to bear any profitable weight at all, that is, in retaining too much exhausted soil under the plough, at the continually recurring expenses of seed and tillage, without the possibility of reaping any thing like adequate returns of crops. In this case, as in most others, the old proverb is verified—"The weakest goes to the wall;" for those who are at the extra expense of sowing the greatest quantity, have by far, and universally, the least produce per acre.

9. *Time of sowing.*—"It has been remarked, that as near the time as possible that Nature, the proto-type of agricultural operations, sheds any particular seed, it always grows with more certainty; and therefore less seed is required when sown early, than when sown late."—*N. Kent.*

"Oats are sown early in March; barley in April, and Wheat late in September, or the beginning of October. But there is too much attention paid to custom herein, and too little regard given to Nature, from whom only, certain rules can be drawn, and by whom



whom they are offered to all who wish to be benefited by them. That we may derive information from this sublime source, let a small portion of the growth of every field of *different grains* be preserved beyond harvest, to operate as a rule to govern succeeding sowings; for when the grain begins to fall naturally from these stalks, the propriety of sowing will be proclaimed by the truest testimony.

“ It is observed, that when the oat catkins begin to shed their seed, it is a proper time to sow barley: and as Linnæus states, that in Sweden, barley is sown when the birch-tree leafs, why might not some other trees serve to direct the farmer as to other seeds? Nature always takes the easiest and shortest way in all her operations; he, therefore, who would imitate her, must do the same. The same power which brings forth the leaves of trees, will make the grain vegetate, and early sowing must accelerate harvest. If a course of observations were made on the leafing of trees, for the purpose of governing the periods of sowing various sorts of grain, some principles of universal utility would be established. \*\*\* Nature is intelligent upon all subjects: happy, truly so, are those who with virtue’s view, read her in all her works. Principle will be their guide, and success their reward.”—*Fox’s Glamorgan*, p. 40.

These hypotheses, plausible and pretty as they are, will not do in this climate, excepting for wheat or rye. Nature would shed a crop of barley about the same time as a crop of wheat; but it does not follow that we should sow spring *barley in October!* Nature is infallible in all its operations, when man does not interfere in those operations; and Mr. N. Kent’s, or Mr. Fox’s rule, might do in climates where our cultivated grains

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grains are indigenous, or the sole offspring of Nature: barley in such places, might shed, and naturally reproduce crops twice or thrice a year.

"Consult Nature annually, with regard to the proper time of sowing different grains, by making the foliation of trees and shrubs your calendar; instead of turning to the sun and stars in the almanack, or the practice of last year, for the particular day and month, neglecting the best information to be obtained from the vegetable tribe around you."—*Linnæus*.

"Certainly, the same state of the earth, air, &c. which brings forth the leaves of trees, in any particular soil, climate, &c. constitutes a natural and universal sign; the more just, on account of even its annual variations. Hence, make a calendar of budding, and other natural phenomena, and compare with the times of sowing."—*Commentator on Linn*.

"Seed-time, its coincidence with several natural phenomena."

"Wheat—At the fall of the ashen leaf, the late fall of the acorn, and variegated appearance of the woods: on the appearance of the field-fare, the dunder period is past."

"Pease and Vetches—As early as the lark arises to sing, and partridges are paired."

"Oats—When rooks begin to build; and the male blossoms of the hazel expand, and shed their farina."

"Barley—At the earliest discovery of the cuckoo, and the white-swol'n buds of the blackthorn."

"Cabbages—At the appearance of the hyacinth (blue-bell), and when the ring-dove (wood pigeon) begins to coo."

"Potatoes—When the wilding or crab apple is in bloom."

"Buck-



“*Buck-Wheat*—When the hawthorn’s bloom is going off with a purple hue; and the young rooks are perceived out of their nests.”

“*Turnips*—When the elder flowers, and the early cherry ripens.”—*Bath Memoirs*, 266.

Were such “Calendars of Flora” set to music, they would afford pretty subjects of amusement to admirers of poetry, and effeminate Virgilian swains: but to plodding farmers, in our variegated climature, they are not only useless, but might lead to serious inconveniences. Were a farmer to delay the sowing of his barley during dry weather in April, to wait for “*the first discovery of the cuckoo; or the white swol’n buds of the blackthorn;*” owing to the frequent vicissitudes of our seasons, and rainy weather setting in, he might now and then be tempted to throw such calendars into the fire. Directions for the best method of preparing *tea* for beverage, or potatoes for food, at their first introduction into this country, might have been acceptable: so to the natives of *New South Wales*, rules for the best time of sowing particular grains, by the budding of particular trees, might be useful; but in *Old South Wales*, and similar places, where agriculture has been long practised, every operation in husbandry forms a link in the chain of annual routine, which is well known, and cannot be misplaced without inconvenience and loss. Old proverbs, such as—“Make hay whilst the sun shines”—“Strike the iron whilst it is hot”—“Sow dry and set wet”—“Delays are dangerous,” &c., are much safer guides to the rustic, than the sublimest nonsense of fanciful theory; whether from the pen of Virgil, Linnæus, Stillingfleet, Kent, or Fox.

As to the time of sowing *wheat* in South Wales, &c.  
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we here again find a verification of the proverb, "*The weakest goes to the wall.*" The hilly farmer is not only necessitated to sow more seed, but commonly also later in the season. One late harvest naturally brings on another: and the hilly farmer seldom thinks of sowing before "harvest-home." There are, however, instances of rye, and even wheat, being sown in elevated situations, so as to be green before harvest be over. This is a prudent step, worthy of more general imitation in such situations, during precarious and late harvests. Clover and pasture leys are frequently ploughed during the showery intervals of a late harvest; in order to expedite seedness when the grain is secured.

When and where harvest is got in during August, or in the beginning of September, seedness commences from the middle to the end of September. A common answer to the question, "When is the best time of sowing wheat in the Vales?" was, "From the New to Old Michaelmas day:" i. e. from Sept. 29th to Oct. 10th. The whole of the month of October, from beginning to end, is the most generally approved time. Crops sown earlier, they say, are apt, on good soils, to become winter-proud: and later sowing has many disadvantages; additional quantity of seed, more precarious weather, shorter days, &c.

"I would rather sow late in February, than late in November or December: I did so last year, and reaped it the first."—*West of Ogmore, Glamorganshire.*

"There is a complaint against the difficulty of harvesting in this humid climate; but sow early, and then you will reap early, before the autumnal rains set in, in general."—*Coal Tract, near Llanelly, Carmarthenshire.*

In this same coal tract, more inland and eastward, in Glamorganshire, on a more elevated situation, the soil in general cold, we heard a solitary apology for late sowing, where it was least to be expected. We here insert it from the communication of a respectable correspondent, without a comment; as it may not be considered as worthy of one, by most of our readers. The reference to the year of the great frost is ingeniously brought in, as a case in point; and there may be still a few living witnesses to ascertain the matter of fact.

"Some of our hilly farmers say that they would never sow wheat before the latter end of November, or the beginning and even to the end of December: when weather sufficiently fair to sow occurs at those times, they have generally better crops than from what was sown earlier. The reason given for this, which is very plausible, is, that the soil being too wet, the corn having sprung up, and a frost ensuing, the roots will be greatly injured; but the frosts coming before the corn sown the last week of November, or in December, vegetates, it is never injured by it; and its harvest will not be much later than that of the corn sown in the earlier part of the autumn, and the certainty of a crop much greater. Late sown crops are not so great a length of time subjected to the danger of frost or wet as those that are sown earlier. In the winter of 1739 and 1740, it is well remembered by many, that the early sown wheat in the vale as well as in the mountains of Glamorgan, failed, so as not to afford above half a crop at best, in many instances not so much: but in both tracts, what was sown late in November, and the two or three first weeks in December, succeeded well; produced full crops, and not above a week later in harvest."

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*Another.*—"In Pembrokeshire, &c. the chief season for sowing is October; but November, *could the season be depended upon*, is found to be preferable: the corn will not be so apt to be winter-proud: it is frequently sown without any disadvantage so late as December, or even January. September, which strangers prefer, who come to settle in this country, and are not acquainted with its climate, is found to be too early; as the corn then sown is apt to run too much into straw, even in the mountainous parts, places exposed to all winds and weathers."—*E. W.*

A Naval Officer, who was perhaps a little negligent in adhering to the prescribed rules of "land-lubbers," sowed wheat the 26th of December; barley the 26th of June; and turnips the beginning of August; with success. The cardinal points, soil and climate, were in his favour, being both highly genial; and he had his native element closely adjoining to leeward, when Eurus blew.

"In wet autumns and soils, the border composts cannot well be carted on the fallows for wheat. It is by some deferred until frost; and in February or March, according to the season, the wheat is sowed; generally white or brown Lammas; and with success."—*Bro Miskin, or Vale of Ely.*

"Sow dry and plant wet," is a general maxim; but most farmers, in a very dry autumn, have an adage—"That wheat should not be sown in the dust." They wait frequently, for several days together, for rain to moisten the land before they sow. They wish for a dry day to sow, and a day or two of fair weather after the seed is sown."—*Clark, in Brecon*, p. 20.

Columella advises to sow in season, be the weather ever so dry: this is sometimes done, without any difference in crop.



10. *Culture whilst growing.*—This, in the broadcast husbandry, is not considerable. Crops on fallows or stubbles, especially on the lighter soils, are pretty commonly rolled during dry weather in March or April. In some places, even in the coal tract about Gelli Gaer, &c. a harrowing across the fallow crops, before rolling, is much approved of. If there be no frost at night, the harrowed ground is left exposed for two nights, and then rolled. Pease have been rolled with good effect in the beginning of April, after they had been spewed up by frost.

Harrowing of wheat crops, where weeds of the parasitical tribe abound, has been found of great service, when performed in due time; before the wheat be overgrown, and as soon as the weeds crawl along the surface, begin to entwine around the wheat stems, and are strong enough to be entangled in the tine of a light and sharp harrow; which eradicates them, and draws them along to be deposited near the headlands. These weeds are the *galium aparine*, cleavers, or hayriff; *convolvulus arvensis*, *polygonum convolvulus*, *polygonum minus*, called bind-weeds and bear-binds; *erum tetraspermum*, tare, &c. whether natural to the soil, or introduced with the seed, or with the impure dung from barn-doors, they are very injurious to growing crops by suffocating them, when permitted to continue.

*Top-dressings* are sometimes bestowed upon wheat crops in the spring, where the materials are conveniently plentiful; and consist mostly of lime alone; sometimes of a light compost of lime and peat soil; coarser's waste; soot; coal and peat-ashes.

An idea prevails in many parts of South Wales, that top-dressing wheat crops with lime, in March or April, will prevent the *smut*, by destroying tainted plants,



whilst it invigorates those which are sound. How in fact these things may turn out, remains to be ascertained by proper experiments: but hitherto credulity prevails more than philosophy. *Feeding* off the crop closely in March, with ewes and lambs, is practised by a few, and disapproved of by many.

A gentleman in the coal tract of Caermarthenshire, who recommended early sowing, in order to reap early; and thereby, upon an average of seasons, to run less risk from precarious harvests in a country naturally humid;—at the same time adopted the practice of spring feeding his wheat crops; which he called—“*a good custom upon the principle of thin sowing.*” But there is something Manichean in this doctrine; for he maintains two principles apparently in opposition to each other: he *sowed early*, to reap early; and he sowed sparingly, to have the crops thickened by spring feeding; which, according to the prevailing opinion, would throw the ripening of the crops to a later period.

The prevailing opinions concur, that spring feeding of wheat renders light soils firmer about the coronal roots of the plants; and consequently that it causes a considerable degree of tillering, which much improves thin sown crops; and that the greatest inconvenience to be apprehended, is its throwing the harvest too late in particular seasons and situations.

11. *Weeding*—is too frequently omitted, where most necessary; and commonly delayed, until thistles, dock, fern, cow-parsnip, &c. the most common weedable plants, are nearly full grown; when they are cut close to the ground by the common weeding hook; a wooden fork being held against the weed, to assist in the operation.

operation. Wooden pincers, to draw up thistles from the root; hoes, paddles, &c. to cut weeds just below the surface of the soil early in April, are but rarely used.

On ferny soils just brought under tillage by enclosures, &c., the fern will for years spring up numerously in the crops. In wheat or rye, they must be weeded, if at all, in the common way, one by one; but in lent crops, the fern generally overtop the corn in May or beginning of June, when the most expeditious method is to cut them by wholesale, with light scythes or reaping hooks, above the corn, and just below the fern branches; and such as are so cut, will not grow again that season; though a later growth, from other roots, may afterwards appear, which should undergo the same operation, if it be thought necessary.

12. *Harvest*.—In a district of such extent, and varieties of soils and elevations, it will readily be conceived that the *time of harvest* is of great latitude. Taking in the whole of the counties, mountains as well as vales, it continues, in early seasons, from the middle of July to the end of September; and in late seasons from the middle of August to the end of October.

One of the earliest spots is between Margam and Briton-ferry, about Aberavon in Glamorganshire, on the least elevated part of the coal tract; being but a few feet above the rise of the adflowing tides: it faces the southern sun; with the steep hills of coal and iron acting as a reverberatory hastener between it and the northern winds. Wheat is here reaped, in early seasons, about the 20th of July: some of it in Neath market the 31st of July.

“ I remember one season, when all the grain in the

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adjoining parishes of St. Athan and Gileston, was harvested and carried before the end of July: the soil a fine loam, upon grey lias limestone, with the Bristol Channel adjoining to the south.”—*J. E.*

*Gower*, though it has excellent soil upon limestone, yet as it is more western, and more fully exposed to the cooling sea breezes, its harvest is somewhat later than that of the Vale of Glamorgan: and the same may be said, and somewhat more, of its counterpart, the hundred of Castle Martin, in Pembrokeshire.

“A piece of seven acres near Swansea, was reaped the 7th of August, 1807, and produced 300 bushels of prime wheat: it grew on a six-tilthed fallow, manured chiefly with lime.”

“Limed fallows are earlier than land otherwise prepared, by a week: ears of limed crops are shorter; but closer set with grain; those of dunged crops are longer, lanker, and with fewer grains.”

“The earlier ripe crops are those on fallows manured with sea sand.”—*Pembrokeshire.*

On the western coast, *Lleiniau Llan Non*, the celebrated Cardiganshire barley tract, is the earliest sown. On forward seasons the grain is there harvested from the 10th to the 20th of July: though a little more inland, or more elevated, the same kind of grain ripens a fortnight later. The western tracts, excepting a few very favourable spots, are later by a week or two, than those which are sown by far more inland, or to the east, such as the vale of the Usk in Brecknockshire, of the Lug and Tame in Radnorshire, &c.

13. *Implements, Modes of Harvesting, &c.*—The reaping hook seems to have been the original tool for cutting all kinds of grain; as it still obtains exclusively in



in some mountainous parts of the three main divisions of Great Britain. There are three modes of using it—1. Hand-reaping (*diorn.fedi*)—2. Swiving (*sier dre-mio*)—3. Bagging (*llaw-daro*). The former, or *hand-reaping*, is the original, and by far the most commendable mode as to neatness of workmanship: it has, however, given way to the other two more expeditious methods, wherever wheat is grown upon a large scale, excepting in the Vale of Glamorgan, and some of its outskirts.

2. *Swiving* is a method first adopted apparently in Cardiganshire; and the dextrous reapers of that county have since extended its use into other parts. The most unsightly part of this operation is at the outset, when the reaper takes hold of the standing corn by twisting a handful of the ears with his left hand; and cutting as he moves, in an easy shaving manner, close to the ground, until a large sheaf is collected at once. This method is considerably more expeditious than *hand-reaping*; it leaves less stubble, but collects more weeds, if there be any in the corn; and the ears are not so regularly laid in the sheaf.

3. Much corn, and too few hands, first suggested *bagging*. After waiting ten months or more for the ripening of the crop, it is painful for those who remember the neat work of *hand-reaping*, to see the slovenly hurry of a reap-day performed in this mode. It found its way unfortunately into Wales from the borders of England, under the name of the Wenlock stroke; and in fact, bears no resemblance to either reaping or mowing, in the proper sense of the terms. Where the scythe can be used, almost any kind of mowing is preferable to it; indeed it has for some years begun to supplant it, even with the naked scythe.

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The *cradle scythe* is an implement of great utility; Fair standing crops of all kinds of grain are cut with it, neatly and expeditiously. It has been in use in Wales time out of mind. Its Welsh name in the north is *pladur agrygol*, and is of very general use in the Vale of Clwyd; in the south it is called *pladur d chawell*, and *pladur d chadair*; and from the latter term it has been called on the English borders, “scythe and *cather*.” Formerly its use in South Wales was mostly confined to the Vale of Towy in Caermarthenshire; from whence its use gradually extended into other counties: some of the Caermarthenshire Militia, quartered at Aberystwyth, introduced it into Cardigan Upper. “About Cardigan town corn is mostly mown: a cradle fixed to the scythe is always used. Reaping is the most common practice in the other parts of the county. The difference in barley is about five to one in favour of the scythe; and in oats about three to one.”—*Original Report*, p. 26.

This great odds between barley and oats is not intelligible without reference to the different modes in which the two grains are respectively reaped in Cardiganshire: barley, when reaped, is generally done in the hand-reaping or slowest method; and oats, the larger kinds, (*brasgeirch*) as well as wheat, are cut in the swiving or quickest method. But five to three is too much odds in favour of *swiving*: in reaping wheat it may be as four to three.

Formerly, provincial practices seemed to be entirely loco-motive; they continued unnoticed where they began. The cradled scythes of the Vale of Towy were scarcely known in the Vale of Teivy; and the swiving method of reaping wheat in the latter, was as little known in the former: though both vales were separated



tated only by a chain of hills running from N. E. to S. W.; whose scattered inhabitants in the mean time participated of both practices. Now, a mutual adoption of each others customs takes place, to the greater expedition of harvest labour.

Cradled scythes, wherever they are used, in five of the counties, are mostly appropriated to the mowing of barley and oat crops. This is reversed in the Vale of Usk, especially in the vicinity of Criekhowell, in Brecknockshire; where they are commonly applied to fair standing crops of *wheat*. A man will mow, in a very neat frugal manner, from two to three acres per day. A mower for a wager is said to have cut seven plough or customary acres; being four acres, two roods, and twenty-nine perches statute. Sir Edward Hamilton, in 1811, had eight acres of spring wheat cut by three men in one day; for which they were paid 5s. an acre. The mowers had left higher stubble than common, in order to avoid the clover, which had been sown with the wheat. This high mowing may be an advantage in showery weather, though not generally thought of, by cutting with these scythes. This spring wheat was the smooth-eared variety, and being sown too early in March, was blighted, or rather frost-bitten, about the middle of April: similar crops, sown later, in the neighbourhood, produced 25 bushels per acre.

The Cardiganshire swiving method of reaping wheat and large oats; the Caermarthenshire method of mowing barley and oats with cradled scythes; and the Brecknockshire method of cutting fair crops of wheat with the same scythes; are the most striking instances of provincial peculiarities; and these have more or less extended into other parts. The naked scythe is the most general implement for cutting barley and oats in

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some parts, especially by those who collect either or both of those crops in the English method without binding.

One other peculiarity is the *hand-reaping* of wheat, universally practised in the Vale of Glamorgan. This mode is slower than the other two methods, probably in the proportion of three to four: but it nevertheless suits the habits of the Glamorgan farmers better than any other. The sheaves are as neat, and the straw and ears as uniformly laid in them, as it is possible for hands to place them. Were they otherwise, the workmen would be at a loss to make their corn ricks so neat, and the thatch roofs of their buildings so simply elegant; in both of which arts they now highly excel.

It will appear, that according to the same scale of the rate of wages, the Glamorgan farmer pays 4*l.* for reaping, for every 3*l.* he would pay by the other more expeditious methods; but this is more than counter-balanced by the future conveniences at every stage and process, from the stacking in the yard to the thrashing on the floor, &c. and probably the surplus of acquired grain by this peculiarly saving method, more than pays the additional expense of reaping.

14. *Gleaning*—was formerly a perquisite of great profit to the industrious poor. Each farmer, in a corn country, had his particular set of gleauing retainers; who, like the vassals of the baronial lords under the feudal tenure, were devoted to his service. At the first day of corn gathering, the gleaners, women and children, assembled in the farmer's hall; and after breakfast, and the dew up, they repaired to the field, where the busy scene commenced. To excite a rivalry in activity, the farmer commonly appointed two leaders  
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of separate and equal numbered parties, who strove for the mastery with such ardour as if they had been Whigs and Tories; or the respective supporters of the two last rival candidates at the county election; which at times they were politically put to represent. The spirit of gaiety, heightened by the harvest shout, lessened the fatigue of active labour; and the farmer had only to see that his work was well done, to have much of it dispatched in a short time.

These scenes were repeated as often as the gathering together of the cut grain was necessary; and during the intermediate days, the poor who assisted had to glean for themselves in the fields where the corn had been gathered; so that at the conclusion, with the presents of bound sheaves given by the farmer, each cottager found himself supplied, by the industry of his wife and children, with grain sufficient to support his family and himself for from two to four or five months, more or less according to circumstances. This tended to excite a spirit of active industry in the poor; and a kind of mutual attachment between them and their benefactors. The labourer's wages, during the consumption of this gleaned supply, was found convenient to pay rent for his house and garden; or to buy necessities, clothing, &c.

Increase in the price of grain, and other necessaries of life, brought about a revolution in the relative connections of farmers and paupers: it set the former to contrive every means to convert *much into more*. The gates in many places became locked against gleaners, until the last sheaf was out of the field, and the hell-rakes had collected nearly the whole of the straggling ears. There was by this time a complication of causes, which, fostered by the laws, ended in the establishment

ment of alarming poor rates; and those who were formerly supported by the exertions of their own industry, cherished by the benevolence of their superiors, were brought to see the advantage of their situation, in being enabled to draw a kind of compulsory, and even independent support, from a public fund created by the exertions of others.

Gleaners are still to be seen; but they are of very different manners and character from those under the old system. They render no assistance whatever to the farmer; and he, in return, deals with them as he does with the crows; he keeps both out of the field to the last. It is not uncommon, in a populous country, to see from fifty to a hundred women and children waiting for many hours at the outside of a gate, until the field be cleared. They run over the stubble for a few hours, and then take their flight together to another field, perhaps in another parish. Most of them may be strangers to the farmer: he knows not whether they are poor, or pretend to be so; but in general, few of them are upon the parish list of paupers, who have been taught to expect their support from another source.

There may be a few instances in which the old system of gleaning is still in vogue; but it is apprehended that they become annually more and more degenerated.

The Vale of Glamorgan has already been noticed, as retaining several ancient and peculiar customs: it is singular also in the article of gleaning. Here, the farmer lets his wheat to be hand-reaped by the acre, with victuals and beer. Each reaper claims a right, by immemorial usage, for his wife, his next of kin, or assign, to glean in the field while the reapers are at work, even among the unbound corn. A hired servant is sometimes permitted to join the taskmen: he claims  
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the same right, and lets it to whom he pleases. Formerly the purchase was not above sixpence for each field; in 1802 it was one shilling; in 1811 half a crown. Strangers coming to farm in the Vale, and thinking it a great a grievance, even as much in some instances as 30s. per acre loss, made several attempts to discontinue the custom; but in vain: the peasants considering it as sacred as the laws of the Medes and Persians. A family will commonly glean fifteen or sixteen bushels; and single women frequently as much as will maintain them the whole year. The custom does not extend to the west of the river Ogmore.

15. *Binding*.—In the infancy of agriculture, the binding of all sorts of corn arose from a principle of economy. At the increase of tillage, in dry climates, it became necessary, for the sake of expedition, to mow out barley into swaths, to be collected into cocks like hay; oats, in some instances, by degrees followed; and only wheat and rye remained to be still bound. With respect to barley, and in a few cases oats, this is the mode of harvesting in some parts of South Wales; in the eastern parts of the counties of Radnor and Brecon, in the northern part of Glamorganshire, and by a few individuals elsewhere. In the other parts they bind all sorts of corn; for which extra trouble, the humidity of the climature is a sufficient apology. Many of the hilly and western farmers prefer reaping barley and oats, for this reason; reaped, they are cut above the weeds and grass that grow amongst them; they may be immediately bound into sheaves, and field-stacked: but mowed, they must lie on the ground for the grass, &c. to wither, for some, perhaps  
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for many days; by which they are exposed to greater risks from the weather. Even in the other parts, where barley and oats are cut with cradled scythes, they are nevertheless, in common with all other corn, generally *bound into sheaves*. The wheat sheaves are tied with bandages of one length of the corn; barley and oats sometimes so, but generally with bandages of two lengths.

In the three western counties of Pembroke, Cardigan, and Caermarthen, whatever be the weather; and in several parts of the three eastern counties, on precarious harvests; the sheaves as soon as bound are immediately stacked into haddocks or helms of about a cart-load each: the butts of the sheaves outward; the cans kept up so as not to be near the ground; and finished in a point, or in a conical form, and covered with inverted sheaves in such a manner as to be very secure against the rain; and is so left till not only all the corn on the farm is so secured, but as much longer as may be necessary to wait for dry weather to carry it; which in some difficult seasons will be a month and perhaps longer. This method is of all others the most proper for the precarious climature of West Wales; and in wet harvests might be, with great advantage, every where adopted. Men soon acquire the knack of speedily stacking the corn in this manner. Instances have been heard of, when the wheat, and other kinds of corn, have, in very rainy seasons, remained out in field-stacks till November, without injury: and then carried a stack at a time, as the dry intervals permitted, into the barns and thrashed; and on some occasions have been in such seasons thrashed stack by stack in the fields, on what are provincially called *plank floors*,  
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being the portable thrashing floors already described in Chap. V. as being the appendages of every farm in Pembrokeshire, &c.

But humid as the climature of West Wales generally is, it nevertheless affords seasons now and then, in which the sheaves might be harvested in fours or sixes, as in other places; and from that state carried at once into the barns or stack-yards. This would be a reduction of labour, and would occasionally prevent the damage of cattle to the field stacks during their long abode in the open fields. Customs frequently induce men to continue uniformly and steadily in one extreme or other: several eastern farmers never haddock their sheaves, save in fours or sixes, without covers, during wet harvests; whilst the western farmers never omit it during established drought. Haddocking in stacks containing from a quarter to two of grain each, should, therefore, be adopted or omitted by both parties, according to existing circumstances and prospects of weather.

Where large haddocks are not in use, sheaves are put together to season, four or six to a stack. The smaller the binding, the sooner they will be fit for carriage, and the less injury they will receive from wet weather: the wind dries them sooner after showers; and hot gleams of sunshine between showers do not occasion the vegetating ferment so rapidly. Weather haddocks on a smaller scale than those of West Wales, are sometimes made in the eastern counties: they consist of eight sheaves, four to a side, with two *inverted*, to cover: or, twelve sheaves, six to a side, and three in an inclined plane, bordering on the horizontal, to cover. Two of the covering sheaves are placed by two

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men, one on each side, the cars in the same direction, and moved steadily upwards, so as nearly to come into contact at the top, and inclosing the whole of the cars of the upright sheaves: these two are bound together by twisting a wisp of each just behind the bandage: the third sheaf is placed in the same direction, to ride upon the other two, so as completely to cover the cavity; and is bound to each, as before, to secure the stack from the effect of strong winds, which occasionally prevail from the south-west during wet harvests. These, the latter especially, have preserved corn during long periods of wet weather.

16. *Loading.*—Where corn or hay is stacked in the field where it grew, the shape of a load is not so material; as briskness is the main point in view: but where loads are to be conveyed to a distance, the art of loading properly, as well as briskly, is not to be neglected; otherwise waste of time, and more journeys will be required. The shape of a proper load would be called by a geometrician, “a parallelopipedon, or a prism whose base is a parallelogram;” and consists of regular courses, fore and aft: the shape of an improper load, if it be of any shape, is, as we have frequently seen, the frustrum of a pyramid; if not a perfect one, ending in a point at the top; which, if a frustrum, would not contain above half, and if a pyramid not above one-third the quantity, or solid content of a proper load of the same base and height. There is no time lost in neat loading; there is, on the contrary, time gained; for the best loaders are commonly the briskest, as in every other work. There are loaders who will each find full employ for two of the most active pitchers in  
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the field by loading loose barley, &c. on a waggon; and cry out "up with it" all day; and yet lay the corner and bonding courses as regularly and perpendicularly as the mouldings of a joiner.

*17. Staddles, Stacks, and Ricks.*—The Glamorgan-shire staddles of entire masonry, smoothly plastered over with good hair-mortar, and capped with projecting flat stones, to prevent the intrusion of rats, &c.; some with ventilating flues, and some not; have been already noticed in Chap. V.

In places convenient to quarries of freestone, pedestals somewhat conical with rounded cap-stones to lay on, are made, with frames of timber to match. These ventilate better than solid ones, but must be more subject to get out of repair.

In a country where wood was in more plenty than lime and stone, we have seen a staddle whose pedestals were made of the butt-ends of tapering and sizeable oak trees, selected from the refuse of a timber-yard; and capped with rounded slate stones about two inches thick.

In places distant from lime and freestone, permanent staddles are seldom seen, excepting in gentlemen's farm-yards, who will get these conveniences, cost what they may. In the absence of staddles, the scites of the stacks, &c. are made yearly with different materials, fuel-wood, gorse, fern, rubbish, straw, &c.; and the ravages frequently committed in these ground stacks by rats and mice, render it expedient to procure staddles in almost any situation, and at any expense.

The generally allowed distinction between a *stack*

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(*das*) and a rick (*mwdwl, bera, &c.*) is, the former having four angles, and the latter being round.

Wheat and rye are more commonly made into ricks; pease, and loose barley, into stacks, and other grains into either, as may best suit the quantity, and other circumstances.

There is some curiosity gratified in observing the identity of local customs, and the uniformity in which particular operations in husbandry are performed over a certain tract of country, to a certain limit; where varieties of customs and modes of operation take place, in modes of tillage, manuring, harvesting; in forms of implements, buildings, gates, stiles, fences; and in the subject of this Section, the formation of *stacks* and *ricks*.

A line from south to north, across the whole Principality, divides the western from the eastern mode of stack-making. In the counties of Pembroke, Carmarthen, and Cardigan, in South Wales; and in the counties of Meirionydd, Caernarvon, and Anglesey, in North Wales, the western mode prevails: in the counties of Glamorgan, Brecknock, and Radnor, in South Wales; and in those of Montgomery, Denbigh, and Flint, in North Wales, the eastern mode is followed.

A stack in the western mode projects very little, if any, over the base, and its top is semicircular. A transverse section of it would represent a Roman gateway; or, in other terms, a semicircle fixed upon either a square, or a parallelogram, according to the height. Its thatch, neatly laid on, of straw, sedge, or rushes, is secured by minute rope traceries, made of hay or straw, in regular net-work; so that, to a herald, a western stack would appear like "a hog in armour, caboshed, &c."

A stack



A stack of the eastern make projects considerably over its base; and the pitch of its roof resembles that of a common building; a transverse section of it would represent an isosceles triangle resting upon the frustrum of a pyramid inverted. Its rope bandages are few, and those only longitudinal, or horizontal.

The characteristics of a western stack—its firm broad basis, its round roof, its net-work tracery; all bespeak its adaption to a bleak western exposure, so as to stand even against the force of a hurricane. The objections made to it are, that its flat roof, and frequent rope tracteries, entangle the rain-water in its passage downwards; that its broad base and perpendicular sides, expose more hay to be damaged by damp and weather; that there is more labour in the formation of the rope tracery; and that neither of these is necessary in the sheltered vallies of the western counties.

The eastern stacks, though they agree in the main principles of projecting over their bases, and in having angular roofs, yet they vary from each other in some points. Some have hipped ends as low as the eaves of the sides: in Glamorgan they have little or none, but continue the projection to the very apex or point at each end. In all, the bandages are horizontal; some more numerous, and nearly at regular distances; others have only three to a side, two near the summit, and one within a few inches of the eaves; with zig-zag rope-lacings to secure the corners of the hipped ends. The fewer the bandages, the lesser the expense; and three have been found secure in bleak situations in Brecknockshire, &c. In such cases, to save roping, the thatcher has a wooden spatula to open an entrance of five or six inches into the stack for every wisp of straw, &c.

In no part of the district, and perhaps in no part of the united kingdom, is the art of making neat stacks carried to such perfection as in Glamorganshire. The wheat ricks are frequently uncommonly large; so round as if they had been turned upon a lathe; and, from the general habit of hand-reaping, without the appearance of a straggling straw or ear on the outside. The bases of hay stacks are cut in an undermining direction around, about three feet deep, with a hay-knife; and whether it tends to preserve the exterior hay of the base from damage or not, it improves the appearance.

“The projection of stacks, &c. in Glamorgan, is carried to a higher pitch than in any of the other counties. About fifty years ago, the clever young fellows (generally the sons of farmers) were *stack-mad*, as we may say; and contended which of them could make stacks of the greatest projection over the bases; and at the same time sufficiently firm and stable. When this curious kind of mania arrived at its height, many stacks were formed nearly of a lozenge or diamond shape, standing upon one corner somewhat flattened; several fell; and the architects were restored to their senses.”

18. *Size of Stacks.*—Where the quantity of corn or hay is small, the size of stacks or ricks cannot be large; but where the quantity is considerable, there is a diversity of opinion as to the most eligible size. In some places, four, five, and from that to eight stacks will be made, which in other parts would have been formed into one. The apologies for the smaller stacks are, that they are more conveniently and readily made and covered during bad weather; that they are in less danger of heating or getting mouldy; that they are readier to be taken in, in convenient quantities, &c. The objections

to them are, that there is some waste of time in dressing them, and of straw in covering them; and when they are of hay, that there is a greater extent lying upon the ground, and of side and end surfaces exposed to be rendered of less value by the weather, &c.: that, the danger of heating, &c. in large stacks may be prevented by ventilating funnels; and moreover, that the larger the stack, well preserved, the more nutritious the hay: that, in precarious weather, stacks of proper width and height may be made in succession at the end of each other, so as to reduce some of the labour of making several detached ones; to lessen the quantity of thatch where hipped ends are in fashion; and to diminish the extent of exposed surface, without any greater inconvenience, by taking the hay or corn into the buildings when wanted.

In some places, in making the elliptical western hay stacks, the horses and loaded sliding cars ascend at one end, and when the hay is tumbled out on the center, they descend over the other end: this is repeated with great expedition until the center becomes too high to permit the ascension of the horses and cars. The ends are then cut with hay-knives, and the hay so cut is put upon the center to finish the stack.

19. *Thrashing*.—We know of no mode of separating the grain from the straw, in this district, anterior to the use of the *flail*; which was the universal implement until lately. Less than a dozen years back there were not a dozen thrashing machines in the six counties: they are now numerous, and are yearly becoming more common.

John Smith, Esq. has one worked by *steam* on his farm at *Gwern llwyn yr wydd*, between Neath and



Swansea: as many as are convenient to streams are turned by *water*; but the generality are necessarily worked by *horses*.

A thrashing machine *worked by water*, is a most valuable appendage to a farm: wherever new farm houses and farm yards are constructed, this ought to be an object of prime attention. Wales, in many parts, abounds with convenient streams. A horse-power machine bears no proportion to this in value: indeed with many, the value of a horse-power machine is problematical; an invention, added to others, for killing horses. We have not heard of *wind* having been made an agent of motion for thrashing: it may be liable to several inconveniences.

There is nothing peculiar in the construction or management of these machines; save that in the Vale of Glamorgan, &c. where hand-reaping, and thatching buildings with uncrushed straw are still the general practices, they are so constructed, that the straw is not permitted to pass beyond the beaters. The feeder of the machine draws back the sheaf when thrashed, and drops it down on his right, to take another from his left. The thrashed sheaf is taken up by a second person by the ears, and drawn through a heckle, to comb out the loose straw, to be bound into thatching bellies or pilions. Sometimes, when hurried, they pass the straw in the common method through the machine: and is used for litter, or for thatching stacks after being wetted and drawn: but this is never done when the straw is intended for thatching buildings.

—Thomas, Esq. of Eglwys Nynydd, near Margam, had one year a crop of wheat much smutted when thrashed by the flail; but the same wheat, in passing through the machine, owing to its quick motion causing a draught

draught of air, was not in the least affected by the black dust\*. Mr. Thomas, nevertheless, is no great advocate for machines in general, when worked by horses: he prefers, upon the whole, the gradual operation of the flail. Many farmers in the Vale, after procuring and trying machines, are of the same opinion. At their first introduction, the few who had them, had the advantage of their neighbours in particular seasons, by being able to bring their corn to market before them, when it sold highest. Now, machines being common, that advantage is annihilated by equality of circumstances. However, where machines are on the best construction, their comparative advantage or disadvantage might be brought to the test by calculation; adding seven or eight per cent. on the prime cost of the machine to the annual wages of labour of men and horses; wear and tear of horses, gearing, machinery, &c. to be balanced against the annual expense of thrashing by the flail.

The two-horse power mills are seldom approved; the three and four horse powers are more common: the latter will thrash clean about 60 bushels of wheat in four hours; more or less according to the produce of the crop and the skill of the maker. Portable machines are also in use, of three and four horse powers. The owners hire them out to their neighbours, for several miles round: the borrower fetching and returning the machine, and paying a pound or guinea a day; the owner employing a mechanic to attend the fitting up and taking down the machine.

Thrashers with the flail are here, as in other places,

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\* Query.—Whether the smutted ears, owing to their being more elastic, passed through the machine unbroken? See p. 399, note.



#### THE CORN-CROWDER CULTIVATOR

of various characters. Some will thrash clean, and at the same time nearly twice as much as others who are generally taskmen, as many of them can hardly be prevailed upon to work by the day. However, upon the whole, much corn is left upon the straw; and hence the advantage of a clean thrashing machine chiefly preponderates.

The boundary of the Glamorganshire tract, where hand-reaping and thatching with uncrushed straw are practised, may easily be defined by a stranger, without any enquiry, by the appearance of recently thatched stacks or buildings: on one side of the boundary, scarcely a green blade appears thereon; on the other side they have frequently full crops of green blades. By this, one might imagine that the Glamorgan flail thrashers are very careful: they may be so, but they have the advantage of thrashing *hand-reaped* sheaves, which are much easier thrashed clean than the slovenly sheaves cut in the *bagging* method, with the ears tumbled into all parts of the sheaves; and more than that, the ears are either cut off before the corn is thrashed, or trimmed from the bellies or wisps in preparing the straw for the roof.

20. *Floors*.—Those made of oak plank, owing to their durability, are preferable to those of any other wood: of late, deal plank floors become more common in woodless tracts, being cheaper, and it is said more elastic than oak.

Oak floors are too frequently made of green or unseasoned plank; and when laid in that state over an open cavity between the beams, without ledges under the joints, they will open, so as to require a rejoining once or even twice in two or three years. To prevent this

this trouble, where seasoned plank are not to be had, the green plank should be laid in running water for a few weeks; and then laid edgewise on a kiln to be dried.

Thrashing floors of argillaceous schist in the slate tract; of micaceous schist, or pennant stones, in the red sandstone and coal tracts; and of limestone flags, especially the lias kind, in the calcareous tracts; where those materials are quarried near the spot. The thrashers complain that these are very heavy floors, and do not work well for want of elasticity.

Mortar floors, or grout floors, of lime, sand, and gravel, are the common house-floors of the limestone tract; and are used for mow-floors in barns in Glamorgan, as a security from vermin; but they are seldom used for thrashing.

“ In Monmouthshire, *loam* floors are used for thrashing; a few such may be seen in Glamorgan, and many in the western counties: when well made they are better than either flag or mortar floors. Where *loam*, naturally good, is not at hand, it may be artificially made with clay and sand properly tempered. *Lime* must not enter into the composition; though added sometimes by such as know no better. *Lime* pulverizes the clay instead of binding it together, which some mistakenly think it will do. A loam floor, properly tempered, will last many years, and is very cheaply made. Limestone loam is not sufficiently tenacious, being of a marly nature; and various changes of weather open and pulverize it.”—*E. IV.*

The portable floors or barn planks, of Pembroke-shire and Cardiganshire, have already been described, in Chap. V. When they are used under cover, the main or under floor is commonly of mortar, especially in the limestone tract.

Where

Where thrashing machines are erected where there are no plank floors already, mortar floors seem to be the most advisable: and the comminuted refuse of the metallic scorise of the blast furnaces and forges of the contract, laid on the surface, and rolled or pressed into the calcareous cement, would form everlasting floors, in places convenient for those materials.

21. *Winnowing*.—The primitive method in the open air, by the agency of the wind, is still practised in some parts. The second mode is in floors, opening the doors; and were the wind of the true pitch, and constant, it is said that three men would winnow 75 bushels of wheat per day.

The third mode is performed by two men or women with a sheet; the third person letting out the corn and chaff from a sieve; and the fourth, a boy or girl, filling the sieves.

These three methods are to be seen, among the small or hilly farmers; but a very small proportion of the grain of the district is winnowed thereby.

The fourth method is with a *fan*, consisting of a frame, and a wheel turning four sails or fanners of hempen cloth or canvas. This is the common implement used by farmers of from 30*l.* to 60*l.* rent.

The fifth method is by a compound, though a well known, implement, called a *winnowing machine*. About the year 1767 the first of the kind was brought into the Vale of Glamorgan by David Moses, a Scottish pedlar from Glasgow. These machines, with some improvement, and advance in price, are now become very common in the eastern parts of the district, so as to be used by most farmers from 80*l.* rent upwards and by several even below that rent: attached to thrashing

thrashing machines, they are rendered still more useful. They are in general much approved of by farmers, who, it must be confessed, have some trouble in bringing their servants and labourers into the same way of thinking. Most of the lower class seem to despise complex machineries; and pretend not to understand them: in fact, they are jealous and apprehensive of their final effect in reducing the price of labour. Very few of these machines, however, have as yet found their way into the three western counties: the original ones cost about 5*l.* each; and now, upon an improved construction, they are advanced to about 8 guineas.

. 22. *Produce.*—Though this subject has been somewhat minutely treated in the course of the Section on Rotations of Crops in the several parts of the district, yet a short recapitulation may not be here amiss.

1. *Slate Tract.*—The poorer soils of this tract are unfortunately the most distant from manures, or such as are auxiliary to the contents of the dunghill; and consequently they are far from being productive; so much so, that in some instances, on untoward seasons, and under bad management, it is said the seed has not been returned. The next gradation produces all varieties, from five to ten bushels per acre\*; but the number of acres so abused or misapplied, fortunately is not great; the occupiers having so much prudence, though destitute of spirit, as to appropriate such soils

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\* "Fifteen gallons seed per acre will do, if you sow early in October, but some sow late as much as 30 gallons per acre; and for want of tilth, or manure, or both, their cast is not above six bushels."—*Rev. J. H. East Redew.*

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to the production of oats, to the summering of lean cattle, and the wintering of sheep. Even in these situations, examples are not wanting here and there, that poor as the soil may be, yet properly manured, and not over-driven, it is capable of doubling the produce obtained in the common way.

The average of the third class, which includes by far the greater part of the tract, may be from fifteen to twenty-two bushels per acre: some in the best soils of the Radnorshire vallies twenty-five: the *Vales of Towy, Teivy*, upper part of the *Vale of Wye*, north and west of *Pembrokeshire*, &c. about the same: though in some instances we have been informed of thirty, thirty-two, and thirty-eight bushels per acre. Wheat on clover leys evidently give the best crops on soils of a moderate tenacity, viz. 24 for 20, and about 28 in lieu of 24 bushels.

**2. Red-Soil Tract.**—The returns of wheat in the poorest cultivated soils of this tract, are not so low as those just mentioned in the slate tract: the red soil is not altogether so ungrateful; and owing to its lying between the blue slate and the middle range of limestone, it is more convenient to calcareous manure. There are, however, some crops in the uplands of *Llywel* and the *Eppynt hills*, which do not produce above from seven to ten bushels; some few approach fifteen. The *Vallies of Honddu, Esgair, Brân*, &c. give from eighteen to nineteen; and a few under better management from 25 to 28 bushels.

The principal part of this tract is the beautiful *Vale of Usk*; but in the original deposition of its soil, water seems to have carried away the finer argillaceous particles below *Crickhowell*, into *Monmouthshire* and the  
*Bristol*



**Bristol Channel**, leaving here too much of the fine silicious ingredient, a reddish sand, to form the density requisite for wheat soils. The average of its produce is represented as being from 19 to 23; and what is rather uncommon in other tracts, the soils on the slopes of the hills, and in the minor valleys ramifying from the Usk, are in several instances of a stronger staple, and produce better crops of wheat. J. Dixon, Esq. of Rhyd-onnen, has had 35 bushels per acre; and a gentleman in Brecon had 40 bushels for two years successively on a broken-up old pasture.

The propriety of turniping for barley, and clovering for wheat on one furrow, to the total exclusion of summer fallows, is strikingly obvious on these dry and light soils: and the superiority of the system has been long seen and practised by farmers of superior discernment.

“To what purpose should there be any summer fallows, since they are found to be not only useless, but hurtful on such a soil? The object in view being to repel, not to admit the scorching sun-beams of summer: hence the plough can scarcely be used too sparingly, nor the roller too much.”—*Mr. Clarke.*

“The soil of the Vale of Usk bears ploughing and working; and the crops are the better for it. I plough my turnip land three times for barley, and it succeeds well.”—*Mr. Dixon.*

There seems to be an obvious distinction, however, between ploughing turnip land for barley three times after it had been trampled by stock, and ploughing the same kind of soil three times during dry weather in summer, for wheat in autumn: what is useful in one case, may be hurtful in the other.

The isthmus between the hills, which connects the parallel

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parallel Vales of the Usk and the Wye, and passing by the Lake of Savaddan, and the Castle of Brynallt, owing to its consisting of a more clayey loam, produces superior crops of wheat. The best part of the Vale of Wye, from the rivulet Calettwr, west of Llanged Castle, down to the Hay, is in this tract; and few spots in the Principality can vie with it, either in richness of soil, or in beauty and sublimity of landscape. Our information as to the returns of wheat, in this Tempe of Brecknockshire and Radnorshire, did not come up to our expectation: the average, we were told, being from 20 to 25 bushels per acre; some 30; and one farmer, on a holding of 400*l.* a year, occupied in mixed husbandry, is said to raise annually from 130 to 160 quarters of wheat.

The red soil, as has been already described in the Section on Soil and Surface, continues south-westward from the Vale of Usk across the Brecknockshire Alps, to the south-eastern limit of the Vale of Towy in Carmarthenshire. It is here, not only much more confined in its breadth, but also of a more tenacious loam, better adapted to the growth of wheat, which is in request for seed into the lighter grey soil of the shale tract, on the opposite side of the Towy. In its further progress through this county and that of Pembroke, it every where exhibits its fertile nature, and gives ample returns of wheat, whenever it meets with any thing like fair play: the anomalous red tract of Castle Martin is of equal, if not superior quality; which is apparently owing to its containing a more due admixture of silex and argill than most soils do in their natural state. This soil deserves a chemical analysis, especially that part of it which gives the strongest dye to water.

**3. Coal Tract.**—The surface of this part of the creation,

tion, is, in general, of a very unpromising aspect in the state of nature. As it occupies the highest grounds in Glamorganshire, and those of the second and third rate in the counties of Brecon and Caermarthen, its elevation must check the progress of the most useful vegetation. In Pembrokeshire it falls much lower; and consequently, its climature at its exit into St. Bride's Bay is the more favourable. It consists of greater varieties of soils than the other tracts: some light, sandy, peaty, &c.; others a stiff clay, producing aquatic mosses, which retain water like a sponge. This clay, however, from its situation and connection with the siliceous measures of the tract, is commonly so intermixed with sand, that it readily falls on exposure to the air by tillage, when made dry by ridging or draining. In this respect it is far superior to the more stubborn clays of the shale or slate tract. It also lies more convenient for lime manure, being situate between lime rocks to the north, east, and south. Coal being such a plentiful fuel, its ashes assist considerably in improving the soil; which naturally is better adapted for tillage than pasture, and is even ameliorated by the frequent application of the plough.

The reported average produce of this tract, about Llanelly in Caermarthenshire, is about 16 bushels: superior management on the same kind of soil gives 32 bushels. The average of Llangyfelach, in Glamorganshire, is from 15 to 20 bushels; whilst on Sir John Morris's demesne at Clasemont, the produce is seldom under 24, and frequently much higher. Indeed we have heard, though we report it with some hesitation, that the produce of the best managed soils of this tract have amounted to 40, and from that to 48 bushels per acre. Evan Morgan, Esq. of Havod Llan-Wynno,

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is reported to have had, by his superior management of the coal tract soil, from 30 to 36, and even 40 bushels per acre. About Little Hewen, Noker, &c. in Pembrokeshire, soil uncommonly good for a coal country, good crops yield about three teals per *stagell*, and very good crops three teals and a half: these quantities reduced to statute measures, both of corn and land, amount to 37 and 43 Winchester bushels per acre.

4. *Southern Limestone Tract*.—This is extensive, and consists of good level soils, with far less alloy than any of the other tracts. It has varieties of substrata; white limestone, and lias limestone; the latter not extending westward out of the Vale of Glamorgan: the former passes under Swansea Bay into Gower; and thence, under Caermarthen Bay into Castle Martin in Pembrokeshire. Gower and Castle Martin are very similarly circumstanced, as to soil, substrata, climate, and peninsular situation. With respect to the produce of wheat, they may both be upon a par with the average of the Vale of Glamorgan; though some particular parts in the latter, such as the Vale of Ely, (*Bro Miskin*) and the flag-lias tract in the eastern part of the Vale of Glamorgan, naturally excel all other soils in South Wales, for the production of wheat.

On the white limestone, soil of a brown colour, lighter than that on the lias limestone, the average produce, under ordinary treatment, is no higher than from 20 to 24 bushels: west of Ogmore 24 is estimated as a poor crop, the average of good management being about 27. On the lias soil, a grey clayey loam, from St. Donat's Castle, to the gypsum cliffs of Penarth, the average is nearly 27. In the Vale of Ely (*Elai*), soil a due admixture of silex (*sand*) from the mountains of the coal tract, with its own fertile loam on limestone,

stone, the produce, with good cultivation, is 40 bushels \*. On the eastern or flag lias tract, Cogan, &c. good management is said have produced 50, and even 55 bushels per acre. Lime is here the most common manure; and considering the tenacity of the soil, it does not appear that it has its due share of proper tillage.

A common adage is, "*Bro Miskin am borwa, a Bro Morganwg am yd,*" i. e. the Vale of Elai, or Miskin, for pasture, and the Vale of Glamorgan for corn. Both Vales are eminent in either production: the former, owing to a deeper and kindlier soil, may produce a greater luxuriance of grass; which biassed the farmer's attention to that article more than in the Vale of Glamorgan, where tillage predominates. The distinctive appellations of the two Vales is more arbitrary than natural; as they run into each other; and are separated only by a gradual slope of a limestone ridge, rising almost imperceptibly; every acre of which is either cultivated or cultivable, excepting woodlands and open quarries.

23. *Manufacture of Bread.*—See Chap. XIV. Sect. 2, on *Provisions*.

## II. BARLEY.

Having expatiated perhaps too diffusely on the subject of *wheat*, we may be allowed to curtail our observations on *barley* within narrower bounds.

### 1. *Pre-*

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\* " A pasture field in this Vale of Ely, or Miskin, overgrown all around the borders with blackthorn, brambles, &c., was cleared in the spring by the grub-axe; and lime, in good quantity, laid thereon, ploughed in, and twice turned over: this compost was carried over the green sward, and more lime laid on the borders and ploughed in: in October the whole field was ploughed, and wheat sowed under the fur-



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1. *Preparation, Tillage, Manure.*—In the Old Husbandry, barley commonly succeeds wheat; in the New Husbandry it universally follows turnips, or some other green crop. In the former case, where the tillage and manuring for the preceding crop of wheat, and the preparation for, and sowing of barley, have been proper and seasonable, it frequently happens that the barley crops in June and the beginning of July, appear equal to the best crops after turnips; and the farmers of the old school seldom fail of introducing such crops to the notice of the abettors of the green crop system, as instances of drawback from the superior merits of the turnip culture: but were the respective barley crops compared later in the season, from the earing of the crops to harvest, and especially in the produce by thrashing, acre for acre, the superiority of barley after turnips would be evident, nine times out of ten.

The number of tilths for barley depends on the state of the soil: it is sown on the second, third, or fourth furrow of a winter-fallow on wheat stubble; and on the first, second, or third furrow of a spring-fallow on turnip land.

In the New Husbandry, barley does not always succeed turnips; on cold soils, and upland situations, oats are found a more profitable crop.

Barley also succeeds pease; especially in the three western counties; where the preparation is accounted as a very probable forerunner of a good crop of barley. In these counties also, barley frequently commences the course, upon an autumn fallow of a limed and

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row; the land laid flat and not in ridges: the crop produced upwards of fifty bushels per acre, of excellent white Lammas, exclusive of the tithe."—*E. W.*

dunged

dunged ley of five or six years standing; to be followed by wheat or pease, and then barley in succession for too many years.

More clover and other grass-seeds are sown with this grain than any other, perhaps in the proportion of twenty to one; and for obvious reasons; it requires the soil in a fine tilth, which agrees with grass-seeds; and its time of sowing being late in the spring, is favourable to the extirpation of weeds.

Few tilths will do for the barley-land of West Wales in general; but in all parts too few are bestowed on strong cohesive wheat soils, to render them sufficiently pulverized for the reception of barley: spiked, and especially knived rollers, should be substituted for the antiquated wooden beetles of the flag-lia tract, &c.

In the Old Husbandry, the manure will have been given with the preceding crop of wheat; in the New Husbandry, with the foregoing crop of turnips, &c. In such parts of West Wales where barley sometimes begins, ends, and constitutes the middle links of the course, it is obvious to expect that it sometimes receives a manuring of dung; which is found to agree with it better than any other white crop; as dung is supposed to render wheat crops more subject to smut; and both them, and those of oats, too lengthy in the straw, and too light in the head.

2. *Sorts.*—1. The common, *long-eared, spring barley*, is the general sort cultivated in the three eastern counties; and is denominated in West Wales, *Barlys*. 2. The *square-eared*, called by some, winter barley, and barley big, and by the Welsh *haidd*, is cultivated

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in some parts of the three western counties, and in Gower in Glamorganshire. The former kind is esteemed the best for making malt, and the latter for the manufacture of bread.

The barley and malt of the lighter soils of the western coasts of the counties of Pembroke and Cardigan, have been in high repute for ages past. By being too repeatedly or continually sown on the same land, and from other causes, such as dryness and lightness of soil, and that covered with innumerable pebbles, the growth in many instances is so short, that it can neither be mowed nor reaped. It is accordingly drawn up by the roots, which, not being cut off before it goes under the flail, renders it unmarketable for bread corn. The grain however being short, plump, and thin-rinded, and consequently of the *rath-ripe* kind, it is eagerly sought after in seed-time. In March and April it is brought in great quantities to the different markets; especially to that of Newcastle Emlyn on the Teivy, where the farmers of the colder soils in the interior of Caermarthenshire come to purchase it.

In the Section on Courses of Crops, we have given a few hints for the improvement of this barley tract, by enclosing, fencing, and the adoption of the alternate green crop system: were the occupiers thereof further to renovate their *rath-ripe* barley, by occasionally changing seed with the farmers of the interior colder soils, their crops might attain the utmost height of perfection. The augmented produce, and the excellence of the sample, might then encourage some adventurers to erect mills on the *Aeron* or the *Gwyrri*, for the purpose of reducing their superior grain into that article of great request in medicine and diet,  
called

called *pearl barley*: and as some persons may be induced to make experiments of that kind, we beg leave to insert a few quotations on the subject.

“ *Pearl barley* is barley freed from the husk, and rounded by a mill: it is reduced to the size of small shot, all but the very heart of the grain being ground away. In mills appropriate to this purpose, the mill-stone is rough-hewn round its circumference; and instead of an under-stone, has below it a wooden case, in which it revolves, and which, on the inside, is lined with a plate of iron pierced like a grater, with holes having their sharp edges turned upwards. The barley is thrown upon the stone, which, as it runs round, draws it in, frees it from the husk, and rounds it; after which, it is put into sieves and sifted.

“ The first mill of the kind was a German invention. In Holland, the first was erected at Saardam, not earlier than the year 1660. This mill, which was at first called the *Pellikaan*, scarcely produced in several years profit sufficient to maintain a family; but in the beginning of the last century, there were at Saardam fifty barley mills, which brought considerable profit to their proprietors.

“ A mill to manufacture pearl barley costs about twenty pounds. A ton, or 160 stone, of pearl barley, sells for 23*l.*, which is rather under 3*s.* per stone, or 13*s.* 4*d.* per bushel\*. Twenty-three stone and a half of common barley produces five stone and a half of pearl barley, by the common method of manufactur-

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\* In March 1813, barley prepared in this manner, and called in the shops, *Scotch barley*, and *shelled barley*, sold in Liverpool at 32*l.* per ton: and was retailed by grocers, &c. at 4*d.* per lb.

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ing it; but by an addition to the mill, which would only cost two pounds, the barley-corn could be split, and then the same quantity would yield *nine stent* of pearl barley. This is stated on the authority of evidence before a Committee of the London Society of Arts.

“ Pearl barley is an excellent ingredient in various kind of soups: made into barley-water, either by itself, or with a variety of additions, it forms an agreeable and valuable drink for the sick room. The simple decoction of it is smooth, uniform, and palatable; the compound decoction of the London Dispensatory is more palatable than the former; and forms a good demulcent liquor in sore throats of every kind, and is very considerably nourishing.”—*Cyclopædia*.

3. *Steeping*—is much recommended, and may be of considerable use in promoting an uniform vegetation in dry climates and soils; but owing to the moisture of the South Walian climate in general, it is here seldom thought necessary.

4. *Quantity sown*.—The same quantity as of wheat is sown by many, in appropriate soils, and in favourable seasons, in the Vale of Usk and its vicinity, in the Vale of Glamorgan, west of Ogmore, &c. in Castle Martin and other places. This quantity is from 20 to 24 gallons per acre.

From 24 to 30 gallons is the most general quantity in the Vales of Glamorgan, Wye, Radnor, Towy, Teivy; and by some in the Vale of Usk in Castle Martin, where 24 gallons is the general quantity, 20 gallons is found sufficient after turnips.

From



From 32 to 40 gallons, in later climatures, Llywel, &c. and even on good soils and favourable seasons, where tillage is neglected. Much of the over driven *barley* tract on the western coast, requires this quantity.

Owing to the allowed appropriateness of the old or long plough to the purpose, not only wheat but much barley also is sown under furrow.

5. *Time of sowing.*—In dry soils and climatures there is less chance of barley crops, except they are sown early, from the middle of March to the middle of April, so as to cover the ground with blades before the commencement of continued heat, &c. The case in South Wales, in general, is different; so that very early sowing of barley is neither necessary nor expedient. The frequency of showers, unless in uncommon seasons of drought, secures the crops, though sown late, especially in the western counties, where the sowing continues from the beginning of April to the middle of May; and, under the pressure of unavoidable circumstances, barley has been sown in June, and good crops obtained. A Welsh proverb says, that “if barley shall have *three dewes of May* (*tri gwylith Mai*) it will do very well.” This extends the sowing season to the 8th or 9th of June, for old May is the May of the proverb; but now, few delay sowing beyond *Hen Galan Mai*, or the 12th of May, in the earlier soils; and in later situations they aim at finishing about a fortnight sooner.

In the grassy soils of South Wales, if barley be sown early, and clover with it, the latter becomes so luxuriant as to damage the barley. The Rev. Dr. Hunt sowed clover and other seeds with barley, the 20th of May, 1811; he had sown clover, &c. with  
barley

barley at the usual season in April, 1811. The earlier sown grasses damaged the barley crop: the crops of barley and grasses sown the 20th of May, were both excellent. It must be owned that the season was moist.

Upon farms of considerable extent, the several operations of husbandry succeed each other as regularly and methodically as the months of the calendar. When the shorter days of winter are past, and February shews numerous symptoms of approaching spring, then beans, vetches, and pease, are committed to the ground; then ploughing for oats, and cross fallowing for barley succeed; then oats are sown, and strong turnip ground prepared, so as to interrupt as little as possible the closely succeeding barley seedness; and where the year of servants terminates on the calends of May, both masters and men unite their exertions to get barley seedness over, and the ploughs and harrows brought into the yard, before the new servants make their appearance: and all this without observing the signs of seasons, either in the almanack, in the budding of trees, or in the cooing of the birds of fanciful naturalists; for, to the farmer, the completion of one operation timely performed, is the most rational signal for the commencement of the next.

*Rolling* is more frequently bestowed on barley than any other crop. In general, the roller is applied between the sowing of barley and that of clover or grass-seeds. Where no grass-seeds are sown, the barley-ground is moreover rolled where necessary, to render the soil finer, and more favourable to the tillering of the crop, as well as for the operations of harvest. Sometimes the roller is applied immediately after the sowing of barley; and sometimes, though less general, it is delayed until the  
blades

blades are a few inches in length, and after a shower of rain, when the clods are easier pulverised. Seeds are sometimes sown among the blades, and rolled in only.

Near kilns, lime is commonly bestowed on such lent crops as are intended to be succeeded by wheat the following autumn, and harrowed in at seedness: in places less convenient, lime is deferred until the blades are up, and sometimes of considerable length; and then applied as a top-dressing. This liming more generally takes place on land newly broken up, and consequently must be less frequently applied to barley than to oats or pease, excepting in the barley tracts of the western counties.

Disputes have arisen as to the most proper state of ripeness in crops. Our ancestors certainly permitted them to stand too long before they were cut; and many of their descendants, especially in the most sequestered parts of the country, follow their example. Pliny's maxim, "Better reap two days too soon, than two days too late," may suit all climates, and is worthy of general attention. Much grain is shed and lost, when cut in a too ripened state; it is moreover in a more forward state of readiness for spiring or sprouting, in case of a sudden fall of rain before it be secured; and the straw is of less value for fodder, thatch, or litter. Wheat always gives the most marketable sample when cut rather under than over; though some argue, that there may be a loss in the meal or farina by early reaping. We do not argue in favour of cutting corn in *too* green a state. However, if only one joint length of the stalks have lost their verdure, there is no more nourishment to be expected from the root or soil; and air will perform its function, in completing the ripening of the ears, as well when cut as when standing.



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In some parts of Cardiganshire, &c. wheat is permitted to grow so ripe, that it may be carried from under the reaper's hand into the barn or stack.

In bleak situations, great losses are sometimes experienced by permitting crops of oats, especially the white short kind, to stand too long: if not cut to-day, to-morrow may be too late; as strong gusts of wind occasionally scatter about the field from one-sixth to one-fourth, and that the best part of the crop.

The proper time of cutting barley for malting, may be judged by the *red roan* on the ear: when it begins to wear away, and before the coat of pearly hue totally disappears, the barley contains more saccharine matter than when it becomes horny, or dead ripe.

The modes of harvesting, &c. are included in the foregoing items on wheat.

6. *Produce.*—The average produce of barley, though poor crops appear too frequent, is nevertheless higher than that of either wheat or oats; as a great part of the district is peculiarly favourable to the growth of barley: and where the soils are too strong, clayey, or wet, or the elevation too high, other grains better adapted are substituted in its stead, in general; though exceptions upon a small scale may not unfrequently be found.

In the uplands of the counties of Brecknock, Radnor, Caermarthen, &c. some crops are as low as nine bushels per acre; thirteen bushels, in such places, is reckoned a fair crop, and some, from better management, reach 19 or 20 bushels.

Stronger soils, better adapted to wheat than barley, produce no more of the latter, in general, than from 22 to 25 bushels: in the Vallies of Radnorshire, from 19 to

**CROPS COMMONLY CULTIVATED—BARLEY. 461**

19 to 25; and, by another information, from 20 to 30: in the Vale of Wye from 30 to 32, and some superior crops, from 48 to 50.

In the Vale of Usk, average 25; some from 36 to 40.

In the Vale of Glamorgan, on the stronger soils, average 17 to 42: on soils more favourable to barley, from 30 to 50. Gower average from 32 to 40; some as high as 50, and from that to 60. Vale of Towy, average from 20 to 25; by superior tillage from 36 to 40, and even 75 bushels per acre.

Castle Martin, with the common management, first crop after wheat on summer-fallow, average 28 to 30; second crop in succession 16 to 20; third crop in succession still less: the average of good management from 30 to 40.

In the coal tract, about Gelli Gaer, from 15 to 30; Clasemont, 28 to 30: in the hundred of Kidwelly, general average from 16 to 20; by superior management, from 28 to 32.

In the Pembrokeshire coal tract, about Capestown, Nolton, &c. soil excellent, considering its situation; four teals of barley per *stangell* is a good but not uncommon crop; five teals have been obtained: four teals answers to 49, and five teals to 61 bushels per acre.

There is excellent barley soil along the western coast from St. Bride's Bay to Fishguard; yielding various returns, according to circumstances, from 20 to 50 bushels per acre; and much less in some instances, under bad management, and too frequent repetitions of the same grain.

In Cardiganshire, as well as other tracts, where barley is so repeatedly sown, its average produce must be considerably diminished.

Strangers



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Strangers who have never seen Wales, consider it something like Siberia, and form very low estimates of its produce in grain. Mr. Donaldson remarks, "that the average returns of barley per acre, were it confined to England, and the south of Scotland, might be rated at 32 bushels; but when Wales and the north of Scotland are included, where, owing to the imperfect mode of culture still practised, the crops are very indifferent, the general average of the island will not probably exceed 28 bushels the acre." We do not see the use of such sweeping guesses as these, and shall therefore offer no remarks upon them.

The authors of the Original Report of Cardiganshire, and indeed most of the Surveyors of Welsh counties, have taken into their heads to run down, almost indiscriminately, the agriculture and produce thereof. Some of the Reporters were strangers to the country and its practices, and some were natives: that the former should err on the side of detraction is no wonder; but that the latter should use their concave mirrors to diminish Walian tillage, grain, and produce, is more difficult to be accounted for.

Mr. Lloyd, in his Cardiganshire, p. 15, in describing the state of the poor, says, "Barley in retail, upon an average of the last seven years, has been little short of 4s. a bushel; which, if you advert to the bad husbandry of this country, is not to the consumer nearly so productive in meal and malt as the English corn, &c. \* \* \*, &c."

By this Report, strangers may be led to imagine that Cardiganshire barley is scarcely superior to the tailings of English barley: yet the same gentleman, in p. 12, gives rather a favourable account of the quantity and quality of barley grown upon his own demesne

at

at Kilgwyn, after turnips: part of the field manured with lime, part with marl, and part with dung compost; apparently by way of experiment on manures.

The part manured for turnips	} 38 bushels, weighing per bushel,	} 51lb.
with <i>dung compost</i> , produced		
barley per acre .....	struck measure, .....	
The part do. with <i>lime</i> , do. (omitted) ditto ditto, .....	51½	
The part do. with <i>marl</i> , do. 42 do. ditto ditto, .....	52½	

This is no contemptible specimen of the quality of Dimetian barley. Mr. Foot, in the Original Report of Middlesex, in writing of the celebrated barley of Fulham, Chelsea, and Chiswick, says—"The farmers of these parishes have the *whitest*, most *thin skinned*, and *mellowest* barley in England; which always fetches the highest price, when sold for seed or for malt. A Winchester bushel of this barley weighed under my own inspection 52lb. but I am *informed*, that, taken on an average of years, it will weigh 56lb.

*We* were also *informed*, by an intelligent Cardiganshire farmer, that the superior samples of barley in his county weighed 58lb. per bushel (struck measure we presume); and that he had once offered a wager, in a company of farmers at Wrexham fair, to produce Cardiganshire barley against the best barley in the counties of Denbigh, Flint, Chester, or Salop.

Mr. Lloyd, in Cardiganshire, p. 12, says, that "the average produce of barley in the lower moiety of Cardiganshire, did not exceed from 16 to 20 bushels per acre; and that even the *first* crop, upon the fallow of a manured ley, seldom exceeded 24 bushels."

Mr. Lloyd wrote this, probably, in the height of his zeal for general improvement; for it is said that he had at one time three thousand acres of his estate in his own occupation to be improved.

Since

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Since the year 1794, in which Mr. Lloyd wrote, by the encouragement held out by the County Agricultural Society, and by the exertions of individuals, the agriculture of Cardiganshire has been much improved. Good crops of barley now give at least 40 bushels per acre; and the former superior number of poor crops, owing solely to the over-cropping of the land, is gradually and steadily diminishing.

Having touched above on the comparative weight of Cardiganshire barley, we shall close this Section with a few particulars on the weight and weighing of corn in general.

*“Corn by weight.”*—The indiscriminate manner in which our corn-dealers buy oats and other corn for exportation, is an obstacle to the growth of good grain: it is a common practice with many of them, to give one general price for the respective grains, without proper regard to the quality. If grain were sold by weight, instead of by measure, the improving farmer, who takes care to sow good seed in well prepared soil, would receive a just compensation for his pains; and the bad one, who attends to neither of those important points, may be stimulated to amend his practice.”—*Mr. Hassall, in Original Report of Caermarthenshire, p. 38.*

The same might have been said with respect to the practice of the two adjoining counties of Cardigan and Pembroke; but of late, dealers are beginning to come into the habit of buying corn by weight.

By an Act of Parliament made in April 1697, it was determined that every round bushel with a plain and even bottom, being made 18½ inches wide throughout, and eight inches deep, should be esteemed a legal

“Winchester

"Winchester bushel," according to the standard in His Majesty's Exchequer. A vessel thus made will contain 2150.42 cubic inches\*.

By 31 Geo. III. c. 30, § 82, all measures shall be computed by the stricken and not by the heaped bushel: and where corn shall be sold by weight, the following weights, in pounds avoirdupois, shall be deemed equal to the Winchester bushel respectively, viz. Wheat 57lb.—Rye 55lb.—Barley 49lb.—Beer or Bigg 42lb. and Oats 38lb.

Bolting mills, with the occupiers thereof buying in grain, and selling out meal and flour, were very rare in the three western counties a few years back. In the Original Report of Caermarthenshire, p. 46, Mr. Hassall says—"The wheaten flour consumed in this district, was for the most part imported from Bristol. The obvious disadvantage of this traffic induced Herbert Lloyd, Esq. of Caermarthen, to erect a mill for the purpose of making sack flour; an undertaking which promises infinite advantage to a great extent of country, by encouraging the farmers to grow wheat in greater quantities, and holding out to them a steady market for it: and the neighbouring inhabitants will be great gainers, inasmuch as they may now be supplied with flour at a cheaper rate than heretofore. The

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\* "In 12 Henry VII. a brass standard bushel was lodged in the Exchequer, where it still remains. This is properly the *Winchester bushel*; and when carefully gauged in 1696, was found to contain 2145.6 cubic inches. The Malt Act, which passed soon after, ordains the *malt bushel* to be 18½ inches wide and 8 inches deep. The result of this is a trifle more than the Winchester bushel. Its product is 2150.2 cubic inches."—"It is usual at present to make bushels according to the Malt Act; I believe no legal decision has been made between it and the true Winchester bushel: the difference is indeed minute, but should certainly be done away by a decisive law."—*Metreux. Agr. Magaz. IV. 166.*

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poor also will be benefited by the establishment of this mill, which supplies them with household bread flour at a lower rate than they can procure it through any other channel."

Bolting cloths for sifting meal or flour, and worked by the motion of the mill, are said to have been first made known in the beginning of the 16th century: and yet such is the slow progress of improvements, that there are not many years since their first appearance in the more secluded parts of the island, including a great part of this district. Mills upon improved constructions are very common in East Wales; insomuch that in a good corn country, without being in the vicinity of either populous towns or manufactures, five mills are to be found on the same river within the space of four miles; all of them costly structures, several stories high.

The occupiers of such mills, besides grinding for their country customers for a share of the grain, called *toll*, or for money by the measure, buy in corn, and sell out meal and flour, *by weight*.

At two capital mills in Builth (*Llanvair ym Mualt*) Brecknockshire, 80 lb. is the required weight for every customary bushel of 40 quarts. Good wheat in the neighbourhood will weigh so much; but the Vale of Wye being here confined to a narrow valley, much wheat is brought from the adjacent uplands of Radnorshire and Brecknockshire, weighing only from 18½ to 19 lb. per customary peck of 10 quarts: the best wheat weighing 64 lb. and the average from 60 to 61 lb. Winchester bushel.

At Caerphili mill 168 lb. is required for the Cardiff *llestraid* measure of 20 gallons: this is as high as 67½ lb. per Winchester bushel; and few samples are up to it; though



though we have been informed of white Lammas at this mill weighing 175 lb. per *llestraid*, which is exactly 70 lb. per standard bushel of 32 quarts.

At Aberthaw mill, in the *lias* tract, the weight lately required was 170 lb. to the *llestraid*, Cowbridge measure of 21 gallons, which answers to  $64\frac{1}{4}$  lb. per Winchester bushel: the weight required is now reduced to 168 lb. being exactly 64 lb. per bushel. It is said that wheat never weighed better than after the harvest of 1801, and that some prime samples of white Lammas on the strong *lias* soils about Aberthaw, weighed 176 lb. per *llestraid*, Cowbridge measure: this was 67 lb. per Winchester bushel.

The red Lammas wheat of Gower, and of other good wheat soils, generally weighs heavier than the white Lammas wheat of the Vale of Glamorgan.

In the slate tract, wheat varies according to soil and other circumstances, from 58 to 64 lb. per Winchester bushel. In Cardiganshire, the weight of barley is frequently within 2 lb. of that of wheat. The average weight of wheat required by mealmen is 2 lb. avoirdupoise per statute quart, whatever be the bushel measure, standard or customary: good rye sometimes approaches this weight.

The statute requires only 38 lb. to the bushel of oats. The customary measure of oats, in most parts, is commonly double that of other grain. In some parts, the bag of oats is 7 heaped measures of 20 quarts each when struck. Mealmen require of the old kinds of oats 11 score pounds to the bag, being nearly  $41\frac{1}{4}$  lb. per Winchester bushel; of the new kind they require commonly 12 score, which answers to 45 lb. per bushel. If the grain be below weight, the buyer deducts the deficiency from the amount; and on the other hand, he

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will make allowance for extra weight; Good samples of either kind of oats will give the required weight; Seven heaped measures are commonly equal to 85 stracks, or 42½ gallons.

*Agent of Motion in Mills.*—The rivers and streams of water being so numerous and convenient in most parts of the district, windmills are not necessary, excepting in the dry southern limestone tract, &c. where one or two haymills are erected.

The most singular agent is that of the tide of a branch of Milford-haven, flowing to the north of the town of Pembroke; the tide being admitted into a spacious reservoir or creek, and let out again under the wheel of a mill erected at the northern end of the bridge.

Water wheels are distinguished by the terms *overshot* and *undershot*: where the fall is sufficient, the overshot wheel is preferred; as in dry weather less quantity of water will serve. The overshot water acts upon the wheel in a twofold capacity; by the impelling force of its descent, and by its weight whilst suspended in the buckets: the undershot water acts upon the wheel only in the single capacity of impelling; and consequently requires more in quantity to apply an equal force.

A mode of applying water to wheels, of superior force to either the simple undershot or simple overshot, has been adopted by the engineers of the iron-works; and from them copied by the grist-mill-wrights of the coal tract, &c.

The first wheel constructed upon this principle, in point of power, and probably also in point of time, is the great wheel called *Eolus*, at the Cyfarthfa iron-works,  
near

near Merthyr Tudful: it received this classic name owing to its great capacity in working four blast bellows: it is all of iron; fifty feet in diameter; and, in the engineering dialect, possessing a fifty-horse power. The water required to work this vast piece of machinery, small in proportion to what is commonly required to work lesser wheels on the old undershot or overshot principles, is conveyed in an aqueduct over the narrow Valley of the greater Taff; and passing through a trough three feet and a half broad, and 16 inches deep, falls on the *near* side of the wheel, about 30 degrees beneath the summit. The revolution of course is that of an undershot wheel. A second trough below conveys about the same quantity of water, and applies it just below the full breast point of the wheel; and both these waters, falling from the buckets, again unite beneath to form an additional undershot power.

Mr. Malkin's description of this wheel, "having the advantage of water *from above, on its centre, and beneath it*; or, in other words, possessing all the forces of an *overshot, breast, and undershot* wheel," cannot be well misunderstood: though some of his readers, without consulting the most obvious laws of mechanics, have considered Eolus both as an undershot and an overshot wheel, which is a total impossibility. Its revolution is that of an undershot wheel; worked by the combined agency of water applied in three different places. This mode of applying water to mill-wheels in general, where a sufficient fall may be obtained, is obviously preferable to any other.

Appendages to mills, and even to farm houses, in the three western counties, are the open kilns for drying corn before it undergoes the operation of shelling or grinding.



The tunnel or flue, to convey the heat, of an easy inclination or ascent, is about 12 feet long; about 30 inches square at the outer aperture, where the fire is kindled; and about 9 inches deep and 30 broad at the upper extremity. This funnel is well covered over with flag stones, and earth closely laid over them, 9 inches thick.

The bed of the kiln at the inner entrance of the funnel, is about four feet wide, curving to 9 or 10 feet at the upper extremity; and about 12 or 14 feet in length, forming the frustrum or base of a parabola of those dimensions. The outer walls, at the height of 14 inches, form a bench or shelf from 10 inches to a foot wide: on this bench are laid spars, (*llinwydd*) from 8 to 10 inches asunder: on these are placed reeds or straw covered with a mat, whereon the corn is laid to dry. The outer walls, above the bench supporting the spars, are about a foot deep; making in the whole about 26 inches above the ground. The bed continues nearly of the same easy ascent or declivity as the funnel; as it is found more convenient in putting on grain at one end, and taking it off at the other end, as it dries.

Barley for meal is dried on these kilns as well as oats. Twenty-two quarters of grain, being ten of oats and twelve of barley, are dried thoroughly in 21 hours: oats require twice the time of barley. Farmers, &c. dry and grind or shell whole loads of grain at a time; which is preserved, and bolted with hand-sieves in their own houses, as occasion may require.

*Stale Furrow*—Various opinions are entertained on this subject; and were circumstances considered, each may be right. On some tough clayey loams, the land is ploughed for oats early in winter, and left in that state to be reduced by successive frosts and thaws to a friable

friable surface: in spring it harrows well, and produces excellent crops: spring ploughing would not do on these soils. Neglect, and other circumstances, sometimes occasion experiments on this point. Part of a manured ley was ploughed for wheat at Michaelmas; the weather preventing sowing, it was left in that state; in February the remaining part was ploughed, and both were sown with oats in March: the autumn ploughed part produced by far the best crop. The Rev. Dr. Hunt of Margam, ploughed a manured piece for wheat in autumn, which circumstances prevented being sown. In spring it was sown with barley, and the produce was 72 bushels per acre.

Land should be clean to sow upon a stale furrow; otherwise couch grasses, coltsfoot, &c. will abound, to the great injury of the spring crops. In such cases, recent ploughings, &c. are absolutely necessary to bring the weeds to wither on the surface.

The hardier couch-roots, be they ever so dry to appearance, ploughed under the furrow, will again revive. Such roots, collected and burned over part of a field; harrowed up, shaken well and spread over the other part; the latter generally produces the best barley.

### III. OATS.

The plants of the genera *triticum* and *hordeum* of our botanists, bear but a faint resemblance to our cultivated wheat and barley plants; excepting the *hordeum murinum*, or wall barley grass: but the dormant wild oat is a pretty perfect likeness of the varieties of grain of that name which we cultivate. Tull says, that "this wild oat cannot be cultivated so as to grow the first



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year. They will resist all enticement till the second year; and many of them will remain dormant till the third, and some still longer."

The natural history of this plant still remains in some obscurity. Farmers are full of anecdotes, which they consider as illustrative of its equivocal generation: some even go as far as to maintain, that one grain has occasionally been transformed into another; sowing barley, and reaping oats, &c. Mr. A. J. of N—, sowed a piece of 24 acres late in autumn with wheat. Whether the blades ever appeared, we know not; but we are credibly informed that in January and early in February, not a blade was to be seen, and the crop was given over for lost. The farmer delayed ploughing it up for barley, until blades appeared, which soon covered the field with the most luxuriant verdure. The plants being wheat was never doubted, though the deep green colour and shape of the leaf might have led to a suspicion. However, about May it turned out by earing, to be a most full and clean crop of wild oats; which were cut and harvested for hay.

This oat seems to be the *avena fatua*, bearded oat grass, or haver. "The seed has a soft hairy covering; grows in fields and hedges; and is one of our most destructive annual weeds in corn. The seeds are used for artificial flies in fishing for trout." It has a strong jointed culm, growing about five feet high in good loamy soils; in which it delights, and frequently appears, and is rarely seen in the adjoining fields of a contrary quality, though similarly managed as to tillage and manure. The root dies as early and effectually as that of any of our cultivated oats; but how such seeds can remain concealed in the ground, and then

then make their appearance at no stated period, but some time, from one to four years or more, is a point not satisfactorily ascertained.

“ If seeds of weeds exist in the soil, without being dropped from the plants, hoeing could not hinder their production, which it evidently does. The belief of that blind doctrine caused the ancients to neglect hoeing.”—*Tull*.

Hoeing repeatedly and seasonably will prevent the growth of annual weeds, whether their generation be equivocal or from proper seeds dropped from plants.

Does this wild oat make its appearance on land that had been for years under the drilling and hoeing system, and afterwards tilled in the broadcast method? for to expect it during hoeing would be in vain.

Does it appear in land formerly producing it, when broken up again, after having been laid down in grass for from five to ten years?

Does it, in any quantity, appear in hedges, according to the account given by botanists; excepting in such as have been recently replenished with soil thrown up from the ditches?

If, as reported, it is more common in spring than in autumn sown crops; is that owing to the previous summer-fallowing? and if it ever appears in wheat, is it always cases not preceded by a summer-fallow?

Is it in any degree prevalent where summer-fallows, &c. are heavily limed?

Is it always or generally considered as the effect of over-cropping?

Of our cultivated oats, that which seems the nearest allied to the annual wild oat just mentioned, is the *blewgeirch*, (*hairy oats*) peculiar to the uplands of Cardigan.

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Cardiganshire\*. Its only recommendation is its hardiness, in producing a moderate crop where no other grain can be expected to grow. It was formerly in greater request than at present; and it is probable that a dozen years more of continued improving tillage will place it entirely among the uncultivated annuals. Notwithstanding the extreme length of its awns (*aristas*) and smallness of grain, it is said to yield more groats or pilcorn, than can well be expected. It is probably the only surviving branch of our primitive oats; the common, if not only broad-grain of our remote ancestors. Our Historical Triads say, that wheat, rye, and barley, were introduced by *Coll ab Collereini*; wheat into *Gwent* (Monmouthshire), barley into *Dyfed* (or west of Pembrokeshire), and rye into *Eivionydd* (part of the promontory, south-west of Snowdon, in Caernarvonshire). When this Patriarch lived we know not; some say that he lived anterior to Caesar's invasion, and that he had his residence in the beautiful Valley of Cuch, which separates the counties of Caermarthen and Pembroke.

The next oat in point of priority is the *old black* kind, a profitable crop on upland soils well managed, and but rarely seen in the Vales. A good sample weighs about 41 lb. per bushel. Its native soil seems to have been strong; for by being sown repeatedly on

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\* The same oat, or one very much resembling it, is cultivated on very light sands in Norfolk; soils that can scarcely be considered as capable of supporting any crop. They answer the purpose of other oats to horses, when given in double quantity; and are supposed, in that proportion, to be fully as nutritious; because, by the length of their awns, they require a greater degree of mastication. This oat is called *bever* in Norfolk, &c.

dry

dry upland soils, without change of seed, they say that it degenerates both in colour and quality, so as at length to resemble the small hairy oat of Cardiganshire. This black oat is generally preferred for wet, and the white sorts for dry soils.

The *old white oat* succeeded: it is generally more full-bodied than the old black kind, but requires better soil; and its weight and price is something superior upon an average: it is in greater request with mealmen, and in less esteem with travellers for their horses, than the black: in the latter case, whim may dictate; for not long since the white was preferred.

The *red oat* has always been in high repute with mealmen: it commonly weighs heavier than any of the old kinds; but its cultivation, notwithstanding, is dwindling apace.

The Polands, both white and black, have had their run; but their thick hides brought them into disrepute.

The quacks puff up medicines which cure all diseases: so the discoverers of the *potatoc oat* proclaimed aloud, that it would thrive in cold barren soils—that it agreed with all varieties of soil—rich and poor—hot and cold—wet and dry," &c. &c. It is, however, a most valuable grain; and we hope ere long that no other oat will be seen in our lowlands.

On elevated wastes, pared and burned, with the addition of 60 bushels per acre of lime to the ashes, spread together, and rye sown under furrow, this oat has produced the following year very ample crops.

The *potatoc oat* crops of the harvest 1812, however, turned out very indifferently in produce, where there were apparently full crops: in March 1813 there was a *hue and cry* among farmers for the old white oat to

SOW

sow in its stead. May, and part of June 1812, was a very wet season in the parts where the above complaint was made; and May 1813, is hitherto (the 22nd) full as wet.

Oats commonly occupied the third place in the rotations of the old school, succeeding barley after wheat; which at one time was the most common course of any. This system is now disapproved of by such as see its tendency to exhaust the soil, and fill it with weeds; and has been superseded by the introduction of turnips into the course, and clovering with the barley crop instead of with the succeeding crop of oats. Clover was found of more precarious growth with the third crop (oats) than with the second crop (barley); as by oats, exclusive of additional exhaustion, having less tilth than barley, and that earlier in the season, the growth of weeds and natural grasses was encouraged, to the detriment, and sometimes to the total exclusion, of the clover.

In the three western counties, oats are cultivated to a large amount; and considerable quantities are exported from thence to Liverpool, Bristol, Dorset, Sussex, &c.

In the three eastern counties, excepting in the uplands, the cultivation of oats is on the decline. "Early soils are unfavourable to oats; and rich soils force them too much into straw; consequently the growing of them has been discontinued by many." In these parts, as well as in Castle Martin, in Pembrokeshire, and some parts of the Vale of Towy in Caermarthenshire, they endeavour to raise, on broken-up leys, and on appropriate soils after turnips, a sufficiency for home consumption. Many in the best Vales do not grow oats at all; but buy them from their neighbours, or from



from the uplands, where they are grown too much in succession.

Oats is, nevertheless, a favourite lay-down crop with those who still continue to leave their land, after a course of tillage, to cover itself with natural sward.

The farmers of the "Englisherie" and "Welsherie" of Pembrokeshire, disagree in their opinions respecting the cultivation of oats: the former say too many are grown; the latter say, "No: as a first crop in the course, they are a preparation for, and diminish the labour and expense of the subsequent fallow for wheat: as a last crop, oats are preferable to barley, to lay down in grass; they exhaust the soil less, and requiring only one ploughing, they leave the soil in a closer texture, with less injury done to the roots of natural grasses, which will grow more freely and more abundantly after oats than after any other crop: its tillage is the least expensive; it exhausts the land less than any other corn crop: it is a hardy grain: its straw furnishes good fodder for cattle; and its grain an important and wholesome article in the food of Welsh men, as well as of English horses."

With this party, dung or some other manure is sometimes bestowed on the lay-down oat crop, for the improvement of the succeeding grass: though they disapprove of the effect of dung in general upon oat crops. When oats is the first crop on ley, to be succeeded by wheat the following autumn, the oats are top-dressed with lime; and dung is commonly added, previous to the last furrow, for wheat. Sometimes the wheat is sown on one furrow, and harrowed in; at other times, according to the state of the soil, a hasty autumn, or Welsh fallow (*braenar brwd*) takes place.

*Quantity*

*Quantity sown.*—This is governed by circumstances; the nature and state of the soil, custom of a particular tract, probably founded on experience; the whim of individuals causing them to differ from their neighbours, &c.

In some places, no more barley than wheat is sown upon an acre; in other parts they make little or no difference between oats and barley. Upon an average of the whole district, the several grains, with respect to the quantity sown per acre, are nearly in the following proportions; though in several places the quantity of each grain is augmented:

Vetches, and small pease, .....	1½
Rye, .....	2
Wheat, .....	3
Large pease, .....	3
Barley, .....	3½
Oats, .....	4½

Very few sow under 30 gallons of oats: the average may be 40; though some in the uplands, and on the coal and slate tracts, extend the quantity to 48, and 50 gallons per acre. It is needless to say, that the smaller and shorter the oat, the more land it will sow; and as some kinds of oats tiller more than others, they require less quantity to the acre: hence the scale of proportion observed by some, of 32 gallons of potatoe oats, 40 of common oats, 42 of Dutch, and about 50 of Poland oats, to the acre.

*Produce.*—This in the uplands is naturally small; oats being so repeatedly sown, augments the evils of soil and climate. Indifferent soils give from 20 to 24 bushels per acre; better management on the coal tract has

has given from 32 to 40; good soils yield from 40 to 50, and 60; we heard of crops on the Teivy affording 75; and on Castle Martin corse, from only 12 gallons seed per acre, 96 bushels have been thrashed. The soil of this reclaimed corse\* is of extraordinary fertility; and from its tillering property, thin sowing is absolutely necessary: on a soil of very different description, on Wervil-Brook Farm in Cardiganshire, one acre and 33 perches, with only three bushels of potatoe-oat seed, produced 41 bushels.

#### IV. RYE.

The fourth and last culmiferous crop, though not so commonly cultivated as the three foregoing, is *rye*. It was formerly a more common crop in Wales than at present. In North Wales, the enclosures of waste lands, about 20 years back, revived its cultivation on a large scale; it is to be expected, that now the rage for enclosing having pervaded South Wales, the case will be the same, wherever the soil is too poor, or the climate too high for wheat.

A considerable quantity of rye is raised in Cardiganshire†: some is grown in Radnorshire: in the Vale of Usk a farmer told us, "wheat tires the soil; rye grows better, and is more commonly sown than

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\* *Wallicè Cors*, a bog, or fen, as *Cors Goch*, *Cors Vochno*, &c. In Scotland, *Carse*, as *Carse of Gowrie*, *Carse of Falkirk*, *Carse of Stirling*, &c.

† "There is in the upper part of the county a considerable quantity of rye. In the uplands it is sown alone; but in the neighbourhood of Aberystwyth, frequently with a mixture of wheat. The mixture makes good bread, sweeter and moister than that of wheat alone. Those who are used to it prefer it to any other."—*Orig. Report*, p. 25.

formerly;

formerly; it gives good returns when manured with lime and dung." This is a soil too light for wheat.

Rye is not grown in any quantity in the southern counties, excepting on Flimston Downs in Castle Marsh, Pembrokeshire; soil dry, but of a fertile quality, from four to twelve inches deep, on limestone. The farmer lets out a portion to a labourer, to be pared with a broad mattock, the sods to be harvested and burned; sometimes at so much per customary acre; at other times for a share of the crop. After the rye, the farmer pursues the rotation of barley, barley, oats, barley, oats, oats: the soil by this time being fatigued, is let to rest for 10 or 20 years, and then the operations of the mattock and fire recur.

*Consumption of Corn.—Exports.—Want of Granaries.*

1. *Radnorshire.*—The acres in tillage being less than half of the open wastes, the produce of grain is barely sufficient for the subsistence of the inhabitants. A great deal more land is susceptible of tillage, and might be ploughed to advantage; but the state of the roads, the distance from lime as a manure, and the expense of labour, occasion it to remain in grass."—*Rev. W. J. Rees.*

"There are no markets near that take off large quantities of produce; all such are at a great distance, and require much time and labour, and expense of teams, &c. that render the profits nothing, and often occasion material losses. Thence the expediency of rearing cattle chiefly: these are taken out of the country by drovers, at no expense to the farmers; but if these chuse to drive the cattle to England, the beasts carry themselves."

"Good

" Good roads would considerably promote tillage; manufactures more; canals, could they be obtained, more than any thing; and a more productive mode of occupation would then take place. Of late years a good deal of corn and dairy produce are sent to Merthyr Tudful, which is now our best market, though at the distance of upwards of 50 miles, through Builth; and over the Wye at Glasbury, the distance is still greater, from the vicinity of Presteign."—*Mr. Weyman.*

2. *Brecknockshire.*—This county is estimated as having less waste lands, though it be nearly double the extent of Radnorshire. It might therefore be expected to grow more grain than its own consumption; but to counterbalance this expectation, it has within itself 16,000 mouths more than Radnorshire has to feed; and whatever superabundance it may grow, it will find ready sale in the neighbouring iron-works and collieries of the counties of Monmouth and Glamorgan: and some barley, by means of the Newport canal, may find its way to Bristol, &c.

3. *Glamorganshire.*—Were a stranger to view the full-eared crops of the Vale of Glamorgan during the month of July, he would imagine that they could not be consumed without conveying the produce to distant markets: however, the case is, that consumption for its wheat and oats is found among its own inhabitants and stock, and those of the extensive and populous iron-works and collieries in the neighbourhood. As barley forms but a small portion of the food of the inhabitants, and as they generally drink more milk than malt liquor, the Vale has a good part of its produce of that grain to be disposed of to Bristol or elsewhere.



Gower is a tract of excellent corn soil; and, like that of the Vale of Glamorgan, upon limestones: but how much soever its tillage may be improved, and its produce augmented, the increase of the population of Swansea and its vicinity keeps pace, and has a regular demand upon its wheat produce. The barley of Gower, and some oats, are exported.

4. *Caermarthenshire*.—"The climate is not found favourable to the growth of *wheat*; except in the Vale, the southern part of the county, and in Laugharne Marsh, which is a strong loam. We seldom see a good sample of *wheat* in the county; and the quantity grown is not sufficient for the consumption of the inhabitants, who import considerable supplies of *wheat* from England.

"It is to be understood, that the moisture of the climate is the objection to raising *wheat* crops, which do not succeed well in very wet seasons: but I have noticed very excellent crops of *wheat* in every part of the county, in seasons favourable to its growth and harvesting."—*Mr. Hassall*.

"Caermarthenshire, perhaps, is the only county in South Wales that imports *wheat* for its consumption. As its soil is generally good, this must be owing to the moisture of the climate being hostile to the production of wheat: blights are supposed to be more common here than in most other counties."—*Rev. Mr. B.*

"*Barley* succeeds better, and produces good crops in bulk; but generally ill-coloured, and frequently thin-bodied, owing to bad harvests and damp seasons for drying and filling the grain."—*Mr. Hassall*.

"On the Newcastle Emlyn, or Teivy side of the range of hills which divides the Vales of Towy and Teivy,

Teivy, there is less rain than in the Vale of Towy; and the soil is better calculated for barley and turnips than any other part of Caermarthenshire. The barley here is of superior quality, fuller bodied, and better coloured."—*Rev. Mr. B.*

"*Oats* constitute the most profitable crop upon the whole in this county. Large quantities are exported annually to Bristol and other markets: the quality but indifferent, as the dealers make very little difference in price between a good and a bad sample: and very little attention seems to be paid, by the generality of farmers, as to the seed or soil of this grain.

"*Wheat* is often very dear in this county; of *barley* and *oats* they raise a superabundance."—*Mr. Hassall.*

5. *Pembrokeshire.*—"The mildness and humidity of climate in this county, render the soils, naturally fertile, uncommonly productive in grass; so that the most judicious agriculturists are of opinion that it is more properly a grazing than a corn country. Crops of corn are frequently very materially injured by the abundance and luxuriance of natural grass, that cannot be subdued by any means of clean fallowing, hoeing, or whatever precautions that may be resorted to.

"The best corn tract in this county is the hundred of Castle Martin, which occupies the southern maritime part, from the town of Tenby on the east, to Milford Haven on the west; the soil for the greater part a sound loam on limestone, producing the finest *wheat* of any in the county; also excellent crops of *barley*, *turnips*, *clover*, &c.; and the grasses are of the best kinds. There is in most places a sufficient depth of this kindly loam: its greatest defect, as in most lime-

stone countries, is its being not sufficiently retentive of moisture; for the rain speedily filtrates through the limestone rock to a great depth; and springs of water, of course brooks and rivers, are less numerous than in other soils of different substrata.

“ This limestone tract, as has been before observed, is intersected by an argillaceous rock of a reddish colour chiefly, but having some of its strata of a greyish colour; both of which decompose in the weather, into an earthy substance of a saponaceous nature, that may be with considerable profit applied as a manure, especially when mixed with lime; for so managed, it makes an excellent compost. The soil on this red rab, as it is called, is rather preferable to that on limestone for grass; but for corn the soil on limestone is preferred.

“ This part of Pembrokeshire, being the most remote from the mountains, is less affected by the rains; which, being chiefly collected or arrested by the mountains, fall in greater quantities, and more frequently, in their nearer vicinities, than they are observed to do here. For this reason, as well as for the superior quality of the soils, the quantity and success of tillage in Castle Martin, not omitting parts of the hundreds of Rowse and Narbeth, is greater than in the other parts of the county; and were it otherwise, the supply of *wheat* in this county would be rather defective.

“ It is said that breeding, grazing, and dairying, would be more profitable than tillage on this tract: perhaps it would be so to the individual, to the grazier or breeder only; but a system that would produce a scarcity of corn in a part of the kingdom that has but few corn districts in its neighbourhood, cannot be recommended by the friends of the lower classes, who subsist chiefly on bread; and especially so in every part  
of



of Wales. If possible, every county should raise as much corn as would supply its population sufficiently; and on all breeding or grazing farms, experience teaches us that a certain portion of tillage is profitable in several respects, exclusive of the grain itself: speculation becomes criminal in all cases where it enriches only a few, and impoverishes many. This argument bears with a tenfold force, when we bring under consideration the late frequent recurrence of years of dearth and scarcity of bread-corn, the steady increase of population in every part of the kingdom, and the present state of intercourse with foreign nations, which latter is at present at the lowest ebb; and though, from the present auspicious prospect of foreign affairs\*, the ports of the granaries of Europe may speedily become open to us, yet dependence on foreign supply must, in the nature of things, be always precarious: and precariousness of supply, especially of the necessaries of life, we ought studiously to avoid by every possible means in our power. Articles of prime import, not only to the welfare, but even to the very existence of society, ought to be secured in the first place; and then what lands we have to spare, may with safety be applied to modes of occupation of secondary consideration.

“The *third* class of Pembrokeshire soils consist of those on the slate rock, or blue rab, as it is called. Of this soil consists the greater part of the county: it is an argillaceous loam of a greyish brown, inclining in some parts to yellow. It is favourable to tillage; and, with judicious management, will produce good crops of every sort of corn. It has every where a moderate

depth, and in most places the herbage is sweet: the sheeps fescue and white clover constitute a considerable portion of it. It is chiefly defective in not having in its composition any of the calcareous ingredient. It consists chiefly of argill, and a large quantity of very fine siliceous earth: a sufficiency of dung *might* every where be raised on it to supply the carbonaceous principle: and lime is frequently requisite; for, without it, crops of corn, in any degree profitable, cannot for any length of time be obtained. Lime, in a great part of this county, lies tolerably near to this soil. Sea sand in other places near the coast may be had, abounding in sea shells, and most of them pretty well pulverized. The shells afford calcareous matter; and the siliceous particles improve by opening the denser soils. Very good crops of wheat, barley, &c. are obtained on lands manured with this shelly sand; and on the grounds thus dressed, white clover greatly abounds. This is particularly observable about St. David's, where this practice prevails; and is said to be more productive of corn, especially of fine *barley*, than even the liming system.

“ The fourth class of Pembrokeshire soils may be termed moor-land; and is to be found partly in the coal tract, and partly in the slate tract. It is a light peaty soil, on a clayey bottom, already described in our definition of those respective tracts. It is generally wet and cold, abounding in springs: but when proper drains are formed, so as to draw off the water issuing from those springs, the surface pared and burned, with the addition of some lime, the peat is *killed*, as they term it, or putrifies, and forms a productive soil. This has been proved by instances sufficiently numerous to shame the occupiers of tracts of this soil into a  
more



more general attention to such a permanent mode of improvement. Judiciously dried, whether by draining or ridging, as may best affect the cause of wetness; tilled for some years until the peatiness perishes, as some express it, and afterwards laid down, it becomes, in proper situations, excellent meadow land; the herbage abundant, and not coarse. For this soil, thus managed, no dressing superior, none perhaps equal, to coal-ashes, where it may be procured in sufficient quantities: it produces white clover abundantly, where it never before appeared. This applies more generally to the coal than the slate tract.

“ To conclude, were the climature less humid, there is not in any part of the kingdom, a tract where the soils are in their own nature more proper for tillage than those of Pembrokeshire. Its natural resources for manure are beyond those of most counties. Lime, shelly sand, or good marl, are, one or the other of them, at hand, or nearly so, in every part of the county; to which may be added another fossil manure, and that is *peat*, though it has not yet been here sufficiently understood, either as burnt into ashes, or made into compost with lime.

“ If to the good qualities of the soils in general, and the uncommon conveniences for varieties of manures, we add the commendable practice of haddocking the corn in field stacks, as before described, to prevent the bad effects of precarious harvests in a humid climature; notwithstanding the slow progress of improvement among many of the farmers, yet we are naturally led to conclude that Pembrokeshire must be an exporter of corn. It has been considered as such for ages back. D. T. the Welsh versifying topographer, about the commencement of the last century, in

describing the character of the inhabitants, the tillage, and commerce of Pembrokeshire, has these lines—

“ Mae rhain yn bobl iachus bytur,  
 Heb geisio ffwr o'u seigiau yn segru,  
 Gan drin yr gol yn beuanu beunydd,  
 Arhai 'n ei gludo i lawer gwledydd;  
 Mae rhai a'u gyrfa tawg Arom,  
 Hyd gwrr y môr i gaernau Meirion;  
 Ac enillyn adre a ddoet ddigonodd  
 Am ydian 'r gwanwyn o dir Gwynedd.”

*In English thus :*

“ These men, healthy and robust, enjoy not their fare in idleness; but employ most of their time in the management of corn; and some convey it into many countries: some steer their course towards Caernarvon, and along the skirts of the sea to the coasts of Meirionydd; and bring home butter and cheese in abundance, for their spring corn, from the regions of North Wales.”

“ Pembrokeshire has a great superabundance of *wheat* and *oats*: wheat in the southern, and oats in the northern and north-western parts. Of course those grains are exported to Liverpool, Bristol, Sussex, and Dorsetshire, in pretty large quantities. The consumption of the lower and many of the middle classes of the inhabitants, is entirely *barley*; and I have some reasons for thinking, that although there may be an exportation of this grain from some parts of the county, it is more than counterbalanced by importation in others, either as *barley* or *malt*: and therefore, upon an average of seven years, I do not think Pembrokeshire supplies itself with its own consumption of *barley*;

ley; though it makes considerable exports of *wheat* and *oats*."—*J. Mirchouse, Esq.*

6. *Cardiganshire*.—This county is inconveniently circumstanced as to manures, being entirely destitute of lime, its marl in hollow dingles, and its shelly sand on the coasts being merely local; yet owing to the examples and exertions of a few spirited improvers, who have founded an Agricultural Society for some years back, the county supplies itself with *wheat* and *rye*, excepting in years of extreme scarcity, and exports its favourite grains of *barley* and *oats*, and likewise wheat in years of plenty.

Mr. Turnor seems to have been in a melancholy mood when he wrote his report of the produce of grain in this county. In p. 13, he says—"They grow less corn than their consumption requires." In p. 31, he adds—"In the winter quarter in scarce years, barley is always under par for the rest of the year: two causes may be assigned for it—the *poverty of the farmers*, and *their want of storehouses*. From Michaelmas to Christmas is a time of the year when there is a considerable demand on the farmer. He has his rent, manure, and servants' wages to pay; and as what he has pocketed in the course of the season from the sale of stock, is by that time expended on other occasions, his poverty too often compels him to an expedient for satisfying these demands; which, if often practised, must in the end prove his ruin. Besides the loss of fodder by thrashing his corn in an untimely season, he is too often obliged to replace the grain he sells, and that frequently at the immoderate expense of more than 50 per cent. Were part of the grain then sold, withholden till the scarce time of the year, the  
price



price might be better kept on a par, the indigent better supplied, and the dealer better paid for the use of his capital, than by the looked for profits of uncertain markets." In p. 34, however, Mr. Turnor allows an exportation of corn.—"As to local advantages of situation, the county of Cardigan is particularly unfortunate. The towns are small, and the inhabitants independent of agriculture, but few in number. The markets, therefore, for the unconsumed commodities are all at a great distance. The black cattle are all taken to Kent and Essex; the pigs and salt butter to Bristol; and the *barley and oats* to Bristol and Liverpool. And as the taking of these to market must be attended with heavy expenses, and the dealers justly entitled to a due profit for their trouble and capital, the sums thus expended are a considerable tax on the farmer, in comparison of districts more advantageously situated."

Mr. Hassall's complaints in Pembrokeshire, p. 42, are in unison, and he writes more copiously on the subject.

"We have not a regular demand for corn, &c. throughout the year upon equal terms with those counties that have manufactories established in or near them. The number of inhabitants who live by handicrafts, and by their provisions, is but small in proportion to those employed in agriculture; which makes the demand for corn, &c. in our markets to be comparatively small; hence it is, that those who grow a large quantity of corn find a great difficulty in selling it. We have corn dealers at the ports, who purchase corn during the autumn and winter months, at a price always much below what is sold at the same time in the open markets. When the wheat is six shillings a bushel

bushel in the market\*, the dealers will hardly give five; and other grain in proportion. The reasons for this difference between the dealer's price and the market price, are these: the dealer buys with a design to export his corn to Bristol, or some other English port; he must take care in buying to provide for storehouse rent, portorage, freight, insurance by sea, commission on sales at the port he sends it to; and lastly, for his own trouble and capital employed. Besides all these expenses, he runs another material risk: our corn is generally so damp, that it will not keep on the lofts without being laid thin, and turned at least once a week; if, in going to a port, a vessel meets with contrary winds, and is delayed on her passage, the cargo frequently heats to such a degree as to reduce its price below prime cost, and then the dealers suffer a great loss by the venture."

P. 56—"It has been remarked, that grain is frequently exported when cheap, and imported when dear. This evil is obviously against the common interest of the country, and ought to be the object of every landlord to redress. The great cause of this injurious traffic is, the bad state of our farm-buildings, and the *want of granaries* for those farmers who can afford to keep a stock of corn upon hand, to lay it up in winter against the summer months. At present, our farm-buildings are so deficient, that a farmer who is obliged to thrash out his barley during the winter, in order to obtain straw to support his out-lying cattle,

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\* When the market price is more than double the above, as it has been these last years, the *dealers* may be easier dealt with: when the markets are low, and the demand dull, then they take the advantage of the farmer.



has not room to keep the corn, and is constrained to sell it, at whatever price happens to be given by the corn-dealers. The utmost many of them can do, is to lay up as much as will supply their own families during the summer, at which time the working people of the district are driven to the most deplorable distress. Barley is the common bread-corn of the district. By the month of June, the stock of barley is generally pretty far exhausted; and then the corn-dealers either import barley from the English ports, or sell out the stock they have bought in the preceding winter. The price hardly ever fails to be a shilling or eighteen-pence a bushel more than it was in the spring; and the poor labourer, who at the best times can earn but a scanty subsistence, is then reduced to a state of distress which calls aloud for the assistance of the affluent. Were our farms more generally furnished with proper *granaries*, these evils would not exist. The farmer would find his account in laying up his corn till a season when he might sell it upon such terms as to answer his trouble and expense of keeping; and the poor man would find a comfortable supply of bread-corn at an easy distance from his cottage."—*Mr. Hassall*.

Both the above woeful complaints were written upwards of 18 years back, and as the country in most places has been improved more in that space than for a century before, some of the causes of complaint have been removed, wherever new farm-buildings, granaries, &c. have been constructed. But still, exhibitions of wretched conveniences are too frequent; and it is to be apprehended that many of them will remain so to a period unknown: the improvement of a whole country must be the work of time.

As

As to the poorer farmers being necessitated to sell off their corn during autumn and the winter quarter, and replace it again in summer, at a very advanced price; as it is a case of extreme distress to them, so it must be of regret to all, excepting to those who profit by their indigence; but it can be remedied only by continuing to excite a spirit of industry and economy, and more general improvement in tillage, among the lower class of farmers; and especially by building for them proper conveniences for the preservation of their thrashed corn.

But after all, the good effect of the poorer farmers becoming enabled to withhold their corn from the market till the time of scarcity, is much suspected by the anonymous writer of a note in the margin of Mr. Turnor's Original Report, who says—"Were all farmers able to withhold their corn from the market till this *supposed time of scarcity*, that very circumstance would render it a time of *glutted plenty*, and the time of scarcity would be that early period from Michaelmas to Christmas, when the corn *would not* be sold. It is very fortunate for all that are obliged to procure bread, that one half of the farmers are poor, the other half \*\*\*—for were *all* farmers poor, a sufficiency of corn could never be raised;—were all rich, the poor would starve."

If we take the above as applied to farmers in *general*, it is certainly too gross a libel: there are many of them, it is true, who are parsimonious, hard-hearted, and of course ignorant in the extreme; but Providence has interspersed others among them, who are as liberal, and as "feelingly alive" to the mutual duties and reciprocal interests of social life and intercourse, as any set of men whatever. These will ever find it convenient,

venient, if not to their interest, is appointed their winter, as well as their spring and summer sale of corn. In years of real scarcity, from failure of crops or bad harvests, a rise in the summer price of corn is almost certain; but in common years, the storing of grain, till the supposed time of higher prices in summer, is running a lottery risk. Mr. A. Young, in one of his publications, gives a very wholesome and rational advice upon this subject; which, though given some years back, will be always *à-propos*. "Farmers in general, are very erroneous in endeavouring to sell their corn at particular times of the year, for upon quarterly averages of twelve years, from 1773 to 1784, both inclusive, the difference of prices is very trifling." As for instance—Wheat, average price of, for the twelve years, in the Christmas quarter 5s. 5½d. per bushel; Lady-Day quarter 5s. 7½d.; Midsummer quarter 5s. 9½d.; and Michaelmas quarter 5s. 5½d.; other grains nearly in the same proportion. "Hence," says Mr. Young, "the farmer should avoid speculation, as sure, in the long run, to prove a loss; but should thrash and sell his corn all within the season of feeding his cattle with the straw: he will gain more in their well doing, and avoiding the depredation of vermin, than he can ever justly expect by the rise of markets."

Some farmers find it convenient to construct what are in Montgomeryshire called "Cheshire Granaries," for the preservation of corn. It is of a cubical form, save that the base is angular like the hopper of a mill: it is made of spars and boards, the upper part on a level with the granary loft above, with a lid or trap-door to let in the corn, which is let out for use or sale through a pipe at the bottom, into a bushel or other measure:

measured: the pipe has a screw fastener, or slider, which may be locked. It may be made of any size, to contain from 40 to 100 bushels, and may be replenished gradually as the contents are lessened. Each side of the chest has wire lattices for the admission of air, and every gallon of corn taken out at the bottom, must give a stirring and airing to the whole mass. What these granaries contain is well preserved from vermin and other pilferers; they are, however, expensive, especially if made of oak.

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## SECT. V.—GREEN CROPS.

### I. PEASE.

WHILST culmiferous crops, oats excepted, are increasing in the quantity cultivated, those of *pease* are gradually becoming less and less, and all agree, that it is owing to the uncertainty of their cropping, and the difficulty of harvesting them in wet seasons.

*Sorts.*—1. *Pys llwydon mowr*—the clay-coloured large hog-pea, with black eyes.

2. *Pys llwydon bach*—a brownish clay-coloured small pea, with black eyes, peculiar to Cardiganshire, and some parts of the adjoining counties of Pembroke and Caermarthen.

“The pea commonly cultivated is of a very inferior sort. It is a small hog-pea, not at all productive. Though sown early in February, it seldom ripens till late in September.”—*Cardigan Orig. Report*, p. 27.

Others are of a different opinion:

“Sown even in April, they will ripen with the later barley

barley in September, though they are later than the large grey pea: they are used by the peasantry for soup, which, though of an unfavourable colour, is well tasted."—*Rev. J. M.*

"The small pea is well adapted for a poor soil, where it is more certain of a crop than the large greys: they ripen betimes, and though somewhat later in ripening than the larger sort, they are nevertheless more productive. They are sometimes thrashed for hogs, but their general use is to be given unthrashed for horses, like vetches. I sow them every year, and have full crops. One bushel and a half is sufficient for an acre; and from that to two bushels at the utmost."—*J. Jones, Esq.*

"The small pea is harvested like vetches for hay, and for this purpose is the best of any, tender and sweet; so that the disappointment is not great when the crop of pulse is small; as hay it still repays. This is not the case with other pease, the haulm of which is but very inferior as fodder to that of *pys bach y wlad*."—*E. IV.*

This pea is sown with oats (*hairy*) and both cut for hay in July.

3. *Pys brychion*—the partridge, or brown-grey pease. This sort was introduced into Cardiganshire by Mr. Peter Lloyd, a North Wales farmer, who rented the demesne of Gogerddan; and afterwards by Scots farmers, brought over by Mr. Johnes, on the Havod estate. "They produce a haulmy smothering crop, but not so productive of pods as the clays."

4. *White boiling pease*—a few, as it were, chartered soils have the privilege of producing these; at least, such is the prevalent opinion: though South Wales, in most parts, abounds with soils apparently favourable,



able to their growth: the Vale of Usk, &c. in the red sandstone tract; the white limestone, and the gravelly loams of the Vale of Glamorgan; the border lying between the white limestone and the coal tract, where the sandy particles brought down from the latter have formed a happy intermixture with the loam of the former, for the production of free and thin shelled boilers; Gower; Castle Martin; Rowse; and the sandy loams of the coast from St. David's to the Dovey. The chiefest check, however, to this crop, is its precariousness: a failing crop is less profitable than a fallow; though no crop is more lucrative than a good one.

“Mr. Lewis of Castleton, in the Vale of Glamorgan, sowed four acres with nine bushels of boiling pease; and from the produce sold 120 bushels, exclusive of the consumption of a family of 20 persons.”

“On the western coasts, white pease in favourable years are very profitable, affording 20 to 25, and sometimes more bushels per acre. The soils, in many parts of Pembroke and Cardigan, are very proper for them; but, owing to the humidity of the climate, are in many cases precarious, subject to run into haulm, and pod but very little; often ripen not till very late, and sometimes never.”

*Pease* are sown—on the furrow of a dry loamy pasture ley, and harrowed in; to be succeeded by wheat in the eastern, and by either wheat or barley in the western counties; but more commonly between corn crops, such as between wheat and barley, between two crops of barley, and between barley and oats. The soil of the perpetual barley tract seems to enjoy the treat of an intervening pea crop; and seldom fails of producing a superior crop of barley the following year

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without its wonted quantum of manure. When pease are sown under the furrow of a winter-fallow, the first ploughing generally takes place about Christmas.

Dung is bestowed on white boilers in some parts, though they withhold it from the grey sorts. Shelly sand is excellently adapted for the production of pease. When pease on ley precede a crop of wheat, they are generally limed as a top-dressing, and dung is added before wheat seedness.

*Time of sowing*—varies, according to circumstances, from late in February to the latter end of March.

*The quantity sown*—also varies, from two bushels of the white boilers and small Cardigan pea, to 20 and 25 gallons of the larger grey sorts, per acre.

There are but few sown in the Vale of Wye, or on the stronger soils of the hundred of Talgarth.

The Vale of Usk has soils more appropriate, and affords commonly excellent crops of both white and grey.

The Vale of Glamorgan has been already noticed as having tracts well adapted to the cultivation of pease; and more especially as it has plenty of lime manure, and in some places sea-sand.

In the Vale of Towy, soil deep, and climature humid, pease are reckoned a very precarious crop. "They are for ever growing, and their being well harvested is a greater risk than that of any other crop."

In Castle Martin—"pease commonly thrive well until nearly in blossom, and then they have frequently the appearance of being blighted."

We met with an enthusiastic theorist for the *smothering* crop system, to the abolition of fallows, who was full of an American anecdote about recovering an estate ruined by over-cropping; and that by means of a succession of pea-crops. He endeavoured to put the scheme

scheme in execution upon an extensive farm under his own management; but unfortunately for his purpose, his farm was situate in the focus of the western climate, and his favourite pease were soon *smothered* by the overwhelming force of the native grasses.

An alternate course of pease and wheat has been tried for years, and with success, on the dry limestone soil of Gower in Glamorganshire; “and was discontinued only for want of a pea-market.”

In the New Husbandry the drilling of pease is practised by a few in the eastern counties; and were the dwarf pease introduced into the field culture of the western counties, a tract naturally so much inclined to grass, they would bear hoeing at proper intervals much later than the common long haulmy sorts.

When pease were more commonly sown, they afforded the main article for fattening hogs. Now they are in most places too scarce, and have been substituted by potatoes, barley meal, and oatmeal. Few hogs are either larger or fatter than those bred and fed in the mountains, where no pease, and few crops of barley are grown. Most persons endeavour to procure a quantity of pease as a finishing feeding, after barley meal or oatmeal; and, as the farmers say, “to render the bacon more solid.”

## II. BEANS.

Field beans (*fffa meusydd*) have been more generally cultivated, by common farmers, about forty years back than at present. Many were then in the habit of sowing beans broadcast; as they found them useful to be ground for their own team-horses, to be mixed with other meal in rearing calves, and with other corn for

household bread. They are now, excepting a few instances, confined to particular tracts—the flag and bastard lia tracts in Glamorganshire, and Loughor Marsh in Caermarthenshire; both excellent bean soils in the latter, within these few years. “beans were sown broadcast on the furrow, and left to rot, without any further trouble of plough or harrow; a wind-blown rattle being erected in the field to chase the rooks.”—*G. P. W. Esq.*

Where beans are sown in rows, the sowing is, in the case of garden-beans, “to prevent the plants running to too great length, and to secure a greater degree of fruitfulness in the pods.”—*H. Knight Esq.* of Tythegston in Glamorganshire, and a few others, drill and hoe their bean crops.

*In Gower*—strong soil: “Sow beans under the furrow on ley—2. wheat—3. barley with manure—4. oats, and lay down.

In soils well adapted to both wheat and beans, some give the precedence in the course to wheat, others to beans; and both sides are positive as to the superiority of their own practice: difference in soil and culture may occasion what is not commonly the case—that both parties are right.

Some few beans are sown in the western counties: in Cardiganshire fields of potatoes were observed, with early beans, mazagon, &c. dibbled into the potatoe rows; the tap-root of the beans not incommencing the potatoe bulbs, a double crop is obtained with very little additional labour. This practice is observable along the western coasts of Wales, on both sides of the Dovey.







tion of its proprietor, J. Goodrich, Esq. we saw a piece of vetches mixed with rye, sown in the proportion of three bushels of vetch and one bushel of rye to an acre: they had been sown so late as October, if not November: the soil a drained turbary of some feet depth: from May 20th to the 14th of June, when we saw the piece, 2208 square yards, somewhat less than half an acre, the crop, without any addition, had well kept by soiling eight horses. The part first cut was fit for a second cutting; the vetches in blossom, and the rye in ear. With this second growth, the soft meadow grass (*holcus lanatus*) called Yorkshire hay seed-grass in some places, and a plant very natural to tilled peaty soils, grew abundantly.

We notice this particular, more owing to the quality of the soil, than any other circumstance. Many other instances, of a greater number of horses, &c. being kept entirely by soiling with vetches, occurred; but they are too numerous to be inserted.

Mr. Morgan of St. Athan, sowed 20 bushels of vetches on six acres: five acres and a quarter were mowed green, which produced eleven tons of dry hay: the remaining three roods were kept for seed, and the produce was 20 bushels. The brush, manured with lime compost, was sown with wheat, which gave a return of  $37\frac{1}{2}$  bushels per acre. Soil a strong loam on the grey lias limestone, rendered more friable by profuse liming.

“Cattle do extremely well on winter and spring vetches: cows fed on them yield more and richer milk than on other winter and spring fodder.”—*Common opinion.*

*Winter and Spring Vetches distinct Varieties.*—“It has been often disputed by farmers, whether there was any

any difference between the summer and winter vetches; but it admits not of a doubt that there is a very material difference between them, in their progress of growth, the shape of their leaf, and in colour. The summer tare is more succulent in stem, grows stouter, and if sown in autumn, from that cause, will not stand the severity of the winter; and they are observed to grow more upright, which exposes them to the severity of the weather; while the winter ones in their early stage of growth, lie close to the earth, and remain for some time stationary, which they will if sown in spring, while the summer ones go on in their growth with vigour. They are different in their size and shape; the winter ones are smaller and of a darker colour, the summer ones speckled and brighter.”—*Practical Norfolk Farmer*.

“I have sown both kinds separately, on the same field, and on the same day in March. The spring vetches gave a very full crop, about three times the quantity of the winter ones.”—*W. D.*

Farmers growing both kinds, should beware of mixing them; otherwise disappointment and loss will follow.

Rye is sometimes mixed with winter vetches, in a small proportion, and oats with spring vetches; in order to prevent their lodging so much, and to correct their heating quality.

“To clean the soil, rendered foul by long tillage, nothing can more effectually prepare it for another crop than spring vetches, sown early, and *thick to ensure a smothering crop.*”

## IV. BUCK-WHEAT,

Is far from being a common crop, though here and there to be met with in each of the counties. It is sometimes sown for the sake of the grain; and sometimes as a vegetable manure, to be ploughed in, for a succeeding crop of wheat. This in strong retentive soils, might be considered an improvement; but it is practised in some places where the soil is already dry, and not cohesive. A good crop smothers most weeds, excepting coltsfoot; is very productive of grain; which, in dear seasons at seed time, frequently approaches the price of wheat: at other times, it forms a good substitute for, and occasions a great saving of wheat, even among tea-drinkers. The grain, well shelled, makes palatable family bread, in the form of light cakes. It is sown in some places as a food for pheasants. Its supposed delicacy causes it to be sown commonly about the latter end of May: this causes late ripening, and a dry October is indispensable to harvest it well: is it not then better to run the risk of a failure of crop early in May, than the loss of a crop late in autumn?

## V. POTATOES.

These ought to have had the lead of all green crops; and the late, and even present, great dearth of corn, make them more valuable in our esteem than ever. There is neither root nor vegetable so universally eaten, and so generally relished at farmers' tables. They suffice with beef, bacon, &c. without bread; which cabbages, turnips, carrots, &c. never do, excepting



cepting with masters of families, who frequently set the unavailing example, when corn is dear.

For a long time after their introduction to this country, they were cultivated upon a very small scale; and, within memory of persons now living, sent from house to house as presents for a national repast on All-Saint's Eve (*Nos calan gaeaf*).

"About 40 years ago, fern, where plentiful, were cut green in June or July, and laid thick on the sward intended for potatoes. In March or April following, the sward, roots and all, would be entirely rotted, and the soil as mellow as that of a garden. The fern were turned over the breadth of the intended trench; the potatoes set on the fern, and mould thrown from the trenches to cover the lazy-beds, as they were since called, when rows came into use. The potatoes procured by this method were clean good crops; and, as they say, better flavoured than any since the general use of dung manure."—*J. H.*

There are three modes of setting:—1. In lazy-beds, with the sets promiscuously laid. 2. In lazy-beds, with the sets in rows, at two or three feet distance, and hoed. 3. In rows, in fields, &c.

The two former modes are now seldom practised, except in particular cases; as the cheapest method of reducing coarse sidelands and rooty soils, &c.; and in the western counties they are preferred, in some instances on unbroken land, and light soils; as the staple is not so much reduced thereby as by the fallow and drill method for a succeeding crop of *wheat*.

The latter is now become the general method; and is well adapted for a succession of *barley*; the earth thereby being more thoroughly stirred and opened; and so brought into that fine tilth that barley requires.

Where

Where the soil is very strong, even wheat would be benefited by this tilth; and in very light soils, the lazy-bed method may be proper, even for barley.

There is not at present, in country places, a cottager without a quantity of potatoes set every year, either in his garden, or in a neighbouring farmer's fallow. If the cottager is possessed of dung manure, the farmer carries it to his fallow, and lays it in heaps in the prepared drills. The cottager sets to the extent of his manure, then hoes and weeds, rises, and carries off the whole crop. If the farmer find the manure, the cottager sets, hoes, and weed; and both divide the crop. If the farmer does not wish a share of the crop, he charges the cottager so much per bushel; or from 4*d.* to 6*d.*, according to the demand, for every 20 yards of row; the cottager to find the seed, to weed, and earth the plants, to the satisfaction of the farmer.

The sorts lately cultivated were the Lancashire whites, as they are called in some places; the Irish black, called in Glamorgan the Scottish schwartz, &c.: at present, the pink-eyed whites become the favourites, and a better sort can scarcely be wished. Some large sorts, cultivated for their productiveness, are exceedingly bad and unwholesome for eating potatoes; and no farmer of common understanding ought to permit them to appear on his table, as they are not sufficiently farinaceous, unless in those uncommonly dry seasons that occur not once in ten, in twenty, perhaps not in fifty years, in our more western climature.

The *curl* in potatoes has not been prevalent for several years back; when it was common, those affected have been planted in bog or peat soil, where it is said they infallibly recovered from that disease; as the plant seed-sets from the peaty soil always produced healthy



as well as plentiful crops: this has been repeatedly tried with success on the banks of the Teivy. Moss, or peat, is called in the north of England—" *The hospital for diseased potatoes.*"

In describing the method of raising seedling potatoes, Dr. A. Hunter, says, "Potatoes when propagated from sets, after a number of years, are found to *decrease in bearing*; for which reason they should be brought back every fourteen years to their original. From a want of attention to this circumstance, I have known potatoes so run out, that they hardly returned treble seed. The farmer complains that his land is tired of them, but the true cause is the age of the sets. The increase of potatoes *raised from seed*, is astonishing: they continue in vigour for about fourteen years; after which the produce gradually declines."

On fallows intended for wheat, the potatoe crops are commonly limed before the first moulding or hoeing; the horses and wheels of the lime-carts passing between the rows.

Too early setting in a weedy fallow, injures the land; and late setting, which would agree best with the cleaning of the fallow, renders the success of the potatoe crop more precarious. The general season of setting in fallows, is immediately after barley seedness.

Two mouldings and weedings, at proper intervals, are necessary for the good of the fallow; though one proper moulding, in a clean soil, commonly ensures the best crop.

In earthing lazy-beds, the mould is thrown from the intermediate trenches, so as nearly to cover the plants. By laying potatoe-stems repeatedly, and covering them with mould, new roots strike out, and  
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an increase of crop, though not of equal ripeness, will be obtained.

Potatoe ridges, or drills, are commonly made of two bouts, or four plits width; which is about three feet from crown to crown. Fifteen inches distance between the sets in the rows has been recommended by writers on potatoe culture; but they are commonly planted here twice, if not thrice that thickness.

*Choice of Sorts, for Succession, &c.*

1. *Dwarf potatoe*, is extremely early, dry, and well flavoured; but small, and not productive.

2. *White*, and *red kidney*; ripe in the beginning of June, if early set.

3. *Manly potatoe*. So called from the name of the person who raised it from seed; an excellent sort; and, considering its earliness, productive.

4. *Pink-eyed whites*; common, and very productive; though beginning to degenerate.

5. Several sorts.—6. The *Ox-noble*, and *Champion*—7. *Winter red*, and *winter white*—8. Several sorts—9. and last of all, the *red potatoe*, called the "*Dublin Apple*;" not productive, but valuable in retaining its freshness and flavour till late in the spring, or even the following summer; when other kinds are become unfit for food.—See *Holt's Survey of Lancashire*.

There is, however, one inconvenience attending the extensive cultivation of potatoes, which is, that like pigs, they are seldom of a medium price, but either too high or too low. When dear, more potatoes will be planted, and more pigs reared: this brings both the following year to the extreme of low price; then the raising

raising of one, and the rearing of the other will be neglected; and both must rise again; and so on, in constant fluctuation.

It is natural to expect, that when corn sells high, potatoes, and all articles of provision will follow.

In the year 1800, when wheat advanced from 12s. to 14s. 18s. and 22s. per bushel, potatoes sold for about 4s.

In 1802, wheat lowered to from 7s. 6d. to 9s.; barley to from 4s. 6d. to 5s.; and potatoes fell in Cardiganshire to 3d. per bushel.

In 1803, farmers sickened at the last year's price, neglected the cultivation of potatoes; and though wheat this year sold so low as from 7s. to 8s., and barley from 3s. to 3s. 6d., yet potatoes, at the season of planting, advanced to 4s. per bushel.

In 1804, though wheat advanced to from 10s. to 11s. 6d., yet owing to the last year's dearth causing a general exertion in cultivating potatoes, they fell this year to 6d. per bushel, in Cardiganshire, and the seller delivering them at the buyers' houses.

Some writers declaim against an extensive cultivation of potatoes, owing to their glutting the markets in some years, and selling below half what the growers can afford them; but as they constitute the chief substitute for bread among the bulk of the nation, their extensive cultivation is by no means to be abandoned; and to attain this point, something like a Bounty Office ought to be established in every county or department, to ensure the grower a minimum price of from 1s. to 18d. per bushel; and this with a view of rendering more tolerable the recurrence of excessive dearth or scarcity of bread-corn.

As to the objection of potatoes being not an article of provision

provision for more than nine months in one year, it may be obviated by a proper succession of early and late sorts, as herein before recommended. The hardest kinds, the pink-eyed whites, the Dublin apple, and the long red, called in some places the "Farmer's Increase," being planted in May, suffered to grow ripe before they are raised, and well stored in suitable tumps; to be opened in spring, and the contents spread in airy out-buildings, without the admission of the sun's rays; they will continue good, without degeneracy in colour or flavour, as far as it will be necessary; that is, until the succession of the earlier sorts of that spring's setting are eatable without loss.

Late in the spring, &c., potatoes are too commonly boiled for the common tables, in their skins, which at that time, owing to the efforts of nature to vegetate, give to the mealy part a dinginess of colour, and an acidity of taste, which could be remedied by paring the potatoes before they are boiled; which is the very time that the disagreeable colour and flavour are communicated to the farina.

In the coal tract, near populous towns, iron and copper works, potatoes are found a more profitable crop than turnips, even by the more enlightened farmers; as potatoes, they say, improve their poachy soil better than turnips; and form a good preparation for barley in preference to wheat: common labourers are more expert in the management of the former than the latter: they find a ready market for them in such populous places; and they feed their stock with what they have above demand.

The Brecknockshire and Cardiganshire Agricultural Societies, have given premiums for potatoes on fallows as a preparation for wheat: the former Society, owing

owing to the prevailing character of the soil of the Vale of Usk, and its minor ramifications, being light, found their error, and withdrew the premium: then the practice was abandoned; and potatoes are now set on part of the turnip land; and both form a preparation for barley the following spring.

*Produce.*—Twenty bushels from one is reckoned a good crop, but not uncommon. Near Tregaron in Cardiganshire, six bushels of the pink-eyed whites, planted on half an acre, produced 24 quarters, being 32 returns. The same farmer the following year set twelve acres, and claimed the premium of the Society; but notwithstanding, it was a losing concern; as the market price dropt below 6d. a bushel.

On the substitution of *potatoc farina* for oatmeal, in the general fare of the inhabitants of some parts of Wales and Scotland, see Chap. XIV. Sect. 2, *On Provisions*.

## VI. TURNIPS.

The tories of former reigns sarcastically attributed the introduction of turnips into the field culture of this kingdom, to a certain era in the History of England\*. Tull says, that, as far as he could be informed, they had been introduced but a few years before his time. Under the term *maip* in North Wales, and *eroïn* in South Wales, they have been known from a very remote period; but probably only in gardens.

The introduction of turnips into the farming of

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\* We are told by a Norfolk farmer, "that the grandfather of the present Marquis Townshend, observing whilst abroad the luxuriant crops of turnips which the Hanoverian fields produced, imported both the seed and culture into his native soil."



*Radnor below the Forest*, has been attributed to a Mrs West, a Norfolk farmer, who, many years back, rented the farm of Mynachdy Powys, on the banks of the Tame, near Knighton. There are now numerous fields of turnips to be seen from Knighton to the Wye, near the Hay; but common farmers sow them broadcast, and take chance crops, thick or thin, clean or not. Gentlemen, and some substantial farmers, manage their crops better. Mr. Lewis of Harpton, and a few others, use the drill and hoe. Turnips have not long since been introduced into *Radnor above the Forest*, Rhaiadr, &c.

Between the Wye and the Usk, the drill and hoe are used by Sir Edward Hamilton, and by some of his tenants under his direction. His drilling system is that of Northumberland and the south of Scotland; the ground is prepared like that of potatoes, with dung laid in the rows, covered with a light double mould-board plough. A roller, nine or ten inches in diameter, extending over two rows, precedes the coulter of the drill: so that in each turn the roller prepares one row before the drill, and completes another after it. The drill is attached to the roller, as both are drawn by the same horse. The sower is a perforated tin box, agitated, when in motion, by cogs in the wheel. A jack chain follows the coulter, to cover the seed.

The anonymous annotator of the Original Report of Brecknockshire, says, "the turnip crops are shamefully neglected for want of being properly hoed; not one acre in thirty being done on the Norfolk system. No land in general in the kingdom, where this root flourishes better than it does in this county, when well managed."

The above writer's one acre in thirty, may now be reduced

reduced to one in fifteen. We saw excellent crops in 1811 in the Vale of Usk, and especially on the more fertile soil of the beautiful valley of *Crom Du*; but too many of them in the state of nature.

The soil of the Vale of Usk, compared with the soils of the more western counties, is easily kept clean; and is therefore well adapted for the cultivation of turnips. Jonathan Dixon, Esq. of Rhyd-onnen, has a method of hoeing, perhaps peculiarly his own: as soon as the turnips are out in leaf, if they are too thick, he causes a sharp harrow to be drawn once in a way across the whole field; and in a week's time, more or less, if he perceives the plants still too thick, he repeats the operation, but in a direction the reverse of the former; and at each time adapting the weight of the harrow to the occasion for it. Mr. D. always found this harrowing to answer his expectation, and to supersede the necessity of hoeing, excepting the hand-weeding of charlock, &c. occasionally.

We have heard of running plough furrows, at proper distances, across turnip fields, as soon as the plants are of a proper growth, thereby converting the broadcast into a kind of drill work.

H. Lewis, Esq. of Gallt y Gog, in the Vale of Towy, in Caermarthenshire, has contrived an implement with three scuffling shares, to be drawn in the direction of the ridges; each share making an opening of nine inches, and leaving intermediate rows of from three to four inches untouched: then the plants in the rows are easily reduced to the proper number, and cleaned from weeds, by the subsequent hand-hoeing of women and children.

These and such expedients for reducing too thick crops, may do very well, and please their respective  
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abettors; but why not rather apply at first to the true method of drilling? as it must be allowed to be more certain in producing a proper crop; and at the same time, upon the whole, not more expensive.

Some make objections to the north country potatoe drills for turnips, on the ground that the land thereby is not regularly manured; the dung being bestowed only in the rows. The same objections may be made to potatoe land; but either of them cross-ploughed, harrowed, and well worked for barley, the manuring will be rendered as uniform as may be deemed necessary\*: and 100 loads of dung, in the drill method, will, upon an average, produce more tons of bulbs than the same quantity will in the broadcast; and cause the improvement, by tillage and hoeing, of a greater quantity of land in the same year. The writer of this article secured a most abundant crop by the drill-manuring method, on a dry summer, when all the broadcast crops in the same country failed. The reason is obvious; every grain of seed is imbedded upon manure, which forces them up into rough leaf, before the fly has time to do any injury.

A great share of the soils of the Vale of Glamorgan is well adapted to the growing of turnips; and as this tract is benefited by the residence of a numerous body of proprietors and enlightened agriculturists, the utility of the culture has been long known; and annual crops are regularly raised by them in manured rows or drills, &c. as well as by spirited inn-holders on the London and Milford mail-road, who manage extensive farms.

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\* In the north, supposing the field to be square, they form the turnip drills diagonally; that is, cross-corner wise; and then, by forming the ridges for barley and clover obliquely across, or parallel to the sides of the square, the manure and soil are uniformly and completely mixed.

Several

Several rack-rented tenants in the Vale grow from 15 to 25 acres of turnips, generally broadcast; but they are too commonly left to chance; and the mode of consuming the crops is not economical. The prime of the crop are carted off into other fields, yards, racks, &c. and the remainder fed off on the land. Some are provided with hurdles, which are formed into folds, and removed regularly once or twice a day; others do not remove them once a week, by which means the sheep are glutted and pinched alternately.

The turnip crops of this Vale lead us to notice the natural obstacles to their growth; as here in one year especially, we observed the greatest havoc made by the black caterpillar. The great adversaries of the turnip culture, are,

1. The fly (*chwain y ddaear*).
2. The slug, a small snail (*malwod y bresych—Gwlith valwod*).
3. The caterpillar (*tailiwr cantroed*).
4. The grub of the cock-chaffer beetle, May-bug, or dozeo beetle.

1. The fly, or black turnip beetle, is the most general cause of failure in crops: it makes its attack whilst the plants are in their infant state, and their leaves tender and smooth. Were the doctrine of equivocal generation allowed, we might attribute this destructive little insect to too fresh, or not thoroughly fermented dung, especially that of the stable-yard; as they are more common on land in which such dung is imbedded and acted upon by solar heat, than on land manured with well rotted dung, compost, lime, or ashes; especially the two latter. The experiments of Leuenhœck and Malphigi, however, seem conclusive on the subject; so that long muck may be more productive of these foes of turnip crops, by affording a more con-

venient *nidus* for the deposition of the eggs of the parent flies, from which issue millions of their offspring.

“ Lord Bacon in his Natural History, mentions several kinds of steepes that greatly accelerate germination. Let it be tried, whether by such steepes, turnips may not be brought more speedily into the rough leaf; and thus in a profitable degree be preserved from the ravages of the *fly*.”

“ Slaked lime, or soot, or peat-ashes, sown over a turnip field, would possibly check the fly. A light cart, with a wire bottom, agitated by contrivances in the axle-tree or wheels, could be constructed for this purpose, filled with lime, &c. and driven over a piece of turnips: this would probably destroy, or profitably check the *slug* and *caterpillar* also.”—*E. W.*

As the steeping of seeds for such a purpose, is a theory now not well received, we may rationally expect that a top-dressing, at or near the period of the fly's appearance, would be more useful. Hence many farmers reserve a portion of the lime designed for the turnip land, and top-dress the fields with it as soon as the plants appear; and that with success. We heard of instances of the whole lime being delayed to that period, which destroyed the whole of the first race of plants; but another race succeeding from the same sowing, being those buried deepest in the soil, produced most excellent and luxuriant crops.

“ I have seen drilled turnips coming up daily for a fortnight together. I sow half the seed four inches deep, and the other half exactly over that, at the depth of half an inch, the seed falling in after the earth had covered the first half. Thus, let the weather be ever so dry, the deepest seed will come up; but if it rains immediately after sowing, the shallow seed will come up first. New seed mixed with old, will cause  
another



another variation; the new coming a day quicker than the old: and these four comings up, give so many chances for escaping the fly; it being often seen that the seed sown over night will be destroyed by the fly, when that sown the next morning will escape; and *vice versa*."

"I have always found *rolling* to disappoint the fly, by closing the soil, and hindering its egress and ingress: but on stiff soils, in the common way, it frequently disappoints the farmer also."—*Tull*.

The writer of this article, in June, 1812, sowed a field with turnip seed, in the common broadcast method. The manure was dung more than half rotted. As the plants sprung up, he found them regularly devoured by the fly, during dry and hot weather. A few showers succeeding, did not alter the prospect of a crop any better. The soil not being dense, he did not consider ploughing necessary: he therefore caused the ground to be harrowed with a heavy, sharp-tined drag, rolled, and then sowed with about the same quantity of seed as before; and afterwards harrowed. This brought up a sufficient crop from the former sown seed, which grew into large-sized turnips; whilst the second seed, thickly growing among them, produced only leaves, and very small bulbs: and he is persuaded, that if the harrowing and rolling only had been performed, without sowing the second time, his crop would have been the better for it. The time that elapsed between the first and second sowing was not noted.

The sowing of radish-seed, or Swedish turnips (*ruta бага*), with the common field turnips has been recommended, and even rewarded with premiums; but as both seeds are slower in growing than that

of common turnips, the latter may be devoured by the fly before the steeping can hasten their germination.

2. The *slug*, or dew snail (*mollusca agrestis*) is not so general an enemy as the fly; dry weather seems to be favourable for the operations of the latter; and moist weather makes the former more active.

If *rolling* be considered serviceable against the fly, it must be still more incommoding to the slug; as the latter requires a more open passage than the former, to and from its underground recess. Slugs are fonder of cabbages, and the tribe of smooth-leaved brassicae, than of turnips when out in rough leaf; and as rolling cannot be resorted to on cabbages, *ducks* have been found, when turned into fields in great numbers, to be very useful auxiliaries. These voracious animals are also recommended to be turned into turnip fields when attacked by the caterpillar; we tried the experiment, and found it useless: either the ducks or the caterpillars of Wales were not of the right sort.

3. The caterpillars of cabbages are said to be the offspring of the butterflies termed *papilio brassicae*, *rapae*, and *napi*; whereas the most destructive on turnips seem to have been deposited by the moth, called *phalaena fuliginosa*. The ravages of these insects were uncommonly great in September, 1805: we saw large fields of turnips, near St. Athan in Glamorganshire, entirely destroyed by myriads of this species.

They performed their work as clean and as regularly as a band of reapers; and to their depredations in that instance, we could not refrain from applying the words of the prophet: "*The land is as the garden of Eden before them, and behind them a desolate wilderness; yea, and nothing shall escape them.*" *Joel*, ii. 3. In some instances, powdered lime was applied,



applied, but without success. *Query*—Whether rooting up the turnip crop, for a few yards breadth, all around the infected part, clearing off the crop, and setting fire to straw or any rubbish to windward, on the cleared openings, would not have arrested their progress? Instinct seems to apprise ducks, however voracious in general, that these black insects are indigestible.

4. The sod-worm, or grub of the cock-chaffer beetle, the May-bug or dozee beetle of Buffon, burrowing under ground, is sometimes found destructive to turnip as well as other crops, on light sandy loams. Rooks, in devouring these insects, are found, in this instance at least, to be the farmer's friends. In strong, or cold soils, these grubs are not found in any number so as to cause alarm: old, hide-bound, or mossy soils, afford more convenient receptacles for them than land under periodical courses of tillage.

To the above four adversaries of the turnip husbandry, may be added a fifth, which in fact forms a greater obstacle than all the vermin put together; these are our native sheep, who carve for themselves in places where fences are not proof against their agility.

Turnips are nearly in the same scale of estimation in the western as in the eastern counties of South Wales. Gentlemen, &c. in both tracts cultivate them on their own demesnes, and have been long ago fully convinced of their great utility: but common farmers do not seem to have any correct idea of the culture of this highly profitable crop. They calculate too superficially upon the subject. They scarcely bring into the account the excellent state it leaves the soil in, when well managed, nor the distant prospect of superior succeeding white crops: neither do they put upon turnips the value

they merit, as food for cattle. Hence several of the common farmers consume their turnip crop all at once in September and October, and sow the field with wheat; others cart very few off into yards and sheds, excepting a few for one or two fattening beasts, to be given with hay and meal. They do not consider how much a good crop of turnips extends a scanty supply of hay, on farms of confined meadow land; nor do they calculate upon very superior crops of clover hay to be expected after the succeeding crop of barley.

For the information of such farmers as either neglect or despise the proper cultivation and management of turnips, we beg leave to state the following particular: The tenant of an upland farm, having very little meadow ground, fed even his calves from November to May entirely with turnips and oat-straw. We saw some of his heifers in calf, rising three years old, sold in December, 1812, for from 15*l.* to 16*l.* each; they never had, to his knowledge, a mouthful of hay during the two winters of their life; and no cattle in the market were in better condition. They were of the common Radnorshire breed, but well-shaped, clean-limbed, and "excellent handlers," as to mellowness of skin, &c. This is certainly no mean instance of the value of turnips in rearing cattle: two year olds, winter-foddered entirely upon straw, without either turnips or hay, would make but mean appearance; and the saving of hay, in certain situations, for other kinds of stock, is a species of economy that repays well.

In some parts of West Wales, to the five vermin-obstacles already noticed, which either retard or completely obstruct the growth of turnips, may be added the natural and continual tendency of the soil to run into grass. In more arid climates, *summer heat* is reckoned



known among the chiefest foes of the turnip culture : here it is not summer heat, but *summer moisture*; for though the latter, in a due medium, encourages the growth of turnips, the foster-children of the soil, yet it encourages still more the growth of the proper offspring of the soil—*Natural grasses*.

In this humid climate, a certain nobleman, who to many good qualities adds that of a spirited farmer, had a well limed, &c. fallow prepared for turnips; which were hoed successively six or seven times; yet such was the great luxuriance of natural grasses, and to such a head had they attained by the 15th of September, when we viewed them, that the ground had more the appearance of a fine piece of natural grass than a turnip field. His lordship had been absent, at another seat on the southern coast, for seven weeks, where he experienced a moderately dry season; but on his return home, found that scarcely a day had passed there without showers.

The common farmers, in the same county, urge this unconquerable tendency of the soil to run into natural grass, as their principal reason for not attempting the cultivation of turnips: it is also urged very frequently, even on the limestone tract of Glamorgan, that without their usually excessive liming, they can never render their fallows sufficiently clean; and that otherwise the grass would too powerfully prevail.

With all due deference to better opinions, we beg leave to insinuate, that even in the very humid climate of the Vale of Towy, &c. turnip crops might be kept cleaner when sown in the broad interval method originally practised on both sides the Tweed, than by any other mode of culture: that is, when the fallow is well prepared, to raise up the land in ridges, or drills  
about



about 26 inches distant from crown to crown, by means of double-breasted ploughs. Common swing ploughs may do the work full as well, if not better; but it is obvious that double ploughs do it in half the time. When the drills are formed, muck, fresh from the dunghill, is laid in the hollows, in the same manner as for potatoes; and the double plough immediately follows to split the former ridges, and throw them upon the manure, so as completely to cover it. Then the drill, preceded by a roller, and both drawn by the same horse, as hereinbefore described at Sir Edward Hamilton's, deposits the corn in a single row, at a proper depth, in a groove formed by the coulter of the drill; and the roller, in returning, presses the side soil upon the seed. The intervals of 26 inches permit the operation of the horse-hoe as soon as the plants are of a proper growth; and women and children cut the superfluous plants and weeds out of the rows, with nine-inch hoes, very expeditiously.

In dry climates, some start objections to these raised ridges; and by rolling, hoeing, &c. much mould is brought into the hollows, lest the plants should be too much parched with drought. In West Wales, probably, this levelling of the surface ought to be avoided; as the elevated ridges would not encourage the growth of grass as much as the common broadcast method, or that of drilling at narrow intervals on flat surfaced land. The broad intervals also allow greater latitude for the use of the horse-hoe, double-breasted plough, &c. and the auxiliary work of hand-hoeing will, by this method, be much expedited.

As to the quantity of crop to be obtained by this recommended mode, it is asserted by those who have had considerable experience, that it is greater upon an average,

average, in the proportion of from 25 to 33 per cent. than crops obtained from broadcast, or drills at narrow intervals, and both well hoed: exclusive of an object of great importance, in a humid climate, the keeping of the land cleaner from grass, &c.

*Steeping.*—"We found a few steeping the seed over-night in train oil, then drying it in the morning with wood-ashes." *J. Goodrich, Esq. &c. &c.*—This may render the seed nauseous to vermin, but it cannot have any effect in preserving the plants. Some wash the seed in pure water, and throw away the light swimmers; this is rational.

*Time of sowing.*—Miller, and others, blame farmers for not sowing turnips earlier in the season of general vegetation. Early sown turnips are convenient in gardens, &c. for family use; but to a farmer, a field crop of summer ripe turnips would be of little profit; exclusive of the consideration, that sowing earlier would too much interfere with other farming operations. Hence the long established usage with us, of deferring the turnip seedness till June, when another obstacle frequently interferes, as June is the chief season of vivification in the *fly* insect. To avoid this evil, two turnip sowing seasons are eligible; one too early, and the other too late, to suffer by the fly. The Swedish turnip (*ruta бага*) is admirably adapted to be sown in the early season, and the common ox, or field turnips in July; and both these seasons have been adopted, in many instances, to the satisfaction of the farmers: still, from the middle to the end of June, is the more general season.

"I endeavour to get my turnip land in readiness,

so as to begin sowing the 16th of June, be the weather what it may."—*J. M. Esq.*

"I delay sowing until July, and find my crops more feebly attacked by the fly."—*R. G. Esq.*

On early soils, wheat stubbles are ploughed as soon as the crop is off, and sowed with turnips, to be fed off by sheep and yearling calves in the spring. Sown in August, the early stone turnip grows to a good size.

Early sown turnips are found to vitiate the flavour of butter in a much greater degree than those of later sown crops: this, it is presumed, is owing to a greater portion of decayed leaves in the former. Winter milchers, fed moderately with turnips, give exceedingly rich milk, and the butter from fresh plants is scarcely, if at all, vitiated.

*Preservation of Crops.*—To this end, fencing is of the first importance. In the woodless and almost fenceless parts of the district, the viciousness of the wild mountain sheep almost totally prohibits the cultivation of winter green crops; and is stated by the farmers as their chief objection to alter their present corn-crop system. These sheep, when bred in enclosures, become more manageable; otherwise few fences are proof against their ravages.

The second preservation is that from *frost*. In Norfolk, the side-rows are drawn up, trimmed root and branch, and collected upon a central row, at convenient distances; with the earth ploughed up on each side, and the top finally well covered. A preferable practice in Scotland, is to take up, sometimes a part, sometimes the whole of a crop, in November; and carting them, when trimmed of roots and leaves, into  
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the rick-yard, where they are piled into stacks, about 10 feet wide, and  $5\frac{1}{2}$  feet high to the eaves of the thatch with which the triangular roof is covered. In 1804, Mr. Sheriff, of Haddington, got a premium from the London Society of Arts (see Trans. vol. 22), for his account of this method. He had stacked the crop of  $12\frac{1}{2}$  acres, amounting to 296 tons, all finished before the 26th of November, and consumed by his stock of sheep and cattle between that time and the following May.

Leaving the Norfolk mode of preserving entirely out of the question, as liable to many objections, the latter method is scarcely necessary in the milder climate of a great part of South Wales; where frosts are very seldom so severe as to injure turnip crops. The advantages of the stacking practice seem to be these: the farmer has a constant supply of turnips at hand for his stock, in all weathers, rain, snow, or frost; and as the field, &c. is cleared in November, with a rapidity resembling that of harvest work, in single or two horse carts, there is an evident saving in the expense of cartage; which, by fetching loads as they are wanted, wastes a good deal of time which might otherwise be profitably employed: but the chief advantage of the practice, considered in Scotland, is to clear the land of the crop, that it may be fallowed before Christmas; which, they say, produces a great improvement in the succeeding crops of barley and clover.

The advantage of stacking turnips upon a large scale, in order to their preservation from frost, need not be adopted in South Wales, excepting in the higher regions of the inland counties; though the advantage of fallowing the turnip land before Christmas, may be well adapted to the stiffer soils of the Vales of Glamor-

Glamorgan, Wye, and Radnor; Longbush, Bristol, and parts of the Vale of Tewy below Caertharthen, &c. The advantage of land being ploughed early in winter, to absorb a store of moisture for the drought of the ensuing spring and summer, can be applied only to certain soils and situations.

The only mode of preserving common turnips in winter, that we have seen practised in this district, is to store up a quantity in empty buildings, to be consumed during frost or deep snow;—or to draw heaps in the fields to be covered with straw. Some have a stock of winter cabbages; as a *dernier resort* in case of necessity, until thaw lays the turnips again open. During frosts, turnips are also matted up in the fields; but how cattle, &c. relish such icy repasts, they are totally silent. How far any or all of these expedients are inferior to the stacking system, we know not; as we have not seen ascertained, the loss in weight, or the damage in quality, of turnips so heaped together for so many months.

“Swedish turnips, properly stacked, have been well preserved till June; but should never be mixed with straw.”—*Vale of Teivy*.

When the best part of the crop is drawn off to be eaten elsewhere, unless hurdles be at hand, the remainder of the crop is, comparatively, but of little value. In woodless tracts, a stock of hurdles is not easily procurable. We have already given hints of the expediency of planting the quick-growing Hop and Huntingdon willows, poplars, larch, &c. in every spot favourable to their growth: the quickest growers of these, in from six to ten years, and the slower sort in from twelve to fifteen, will form materials for hurdles, gates, and other rural purposes.

*Rules*



*Ruta Baga*, or Swedish turnips, are cultivated as part of the green-crop stock, by most of such as know their value for late spring feeding; when the common sorts are either consumed or decayed: they frequently disappoint the farmer's expectation, when not sown before the middle of June.

Turnip rooted cabbages resist our severest frosts, and, like *ruta бага*, are reserved for the last in the season. Both afford a good supply during the dilemma between turnips and grass.

About the first introduction of turnip culture, a good sower was esteemed a *rara avis*; and went his circuit regularly. Now, every person who can take a few seed between his fingers and thumb, and adapt his cast to his step, may sow broadcast as well as the best.

Tull's drilling was at length adopted in some parts of this district: now, varieties of drills are used, bearing the names of the patentees, makers, or the country they come from. Some use the Norfolk turnip-sower, a light deal box, nine feet long, a few inches square, and divided into twelve perforated boxes; to be carried horizontally, and agitated by the sower as he goes his rounds.

Varieties of turnips are grown, distinguished by their shape, as the Tancred or Tankard, &c. or by the colour of the tops of the bulbs, as green, purple, &c. A cream coloured turnip, gives a good crop, of a middling size, which seems to be a variety of the garden turnip; its excellence for the table is a temptation to the depredators; and it seems moreover to be too early for field culture; the green and purple tops are therefore preferable. "The Swedish and Scotch yellows please me well: the latter I particularly recommend for an early

early crop, and for fattening cattle\*.”—*Sir Edward Hamilton.*

## VII. CABBAGES.

These, on appropriate soils, are grown on a good scale, and of a large size, by the few scattered patrons of the New Husbandry.

On dense or damp soils, they are planted on raised two bout ridges, manured as for potatoes, or in the Tweed method of growing turnips at broad intervals. On lighter and drier soils, the prepared ground is manured over as for broadcast turnips, and formed into broad ridges of several yards width; and not harrowed, that the plits may serve for lines to direct the dibblers. In both methods, the horse and hand hoes are applied as frequent as occasion requires.

Farmers too commonly give the preference to August sown plants, for no other reason than that they appear stronger at the time of setting. These ripen too early, and will not retain their soundness much beyond Christmas: hence the expediency of planting only a third or fourth part of the ground with these plants; and the remainder with March or spring sown plants, which will continue in vigour till far in the spring.

The inconveniency in procuring good plants in some situations, makes the cultivation of cabbages more troublesome than that of turnips. Mr. A. Young recommends that every cultivator should raise his own seed from the best kinds. “I am apprehensive,” he says, “that the great American cabbage, which thirty

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\* *Query.*—Whether the Scotch yellows be not the same as those called in North Wales *Maiip Sir Fia*, or Anglesea turnips?—*North Wales Report*, p. 201.

years ago was to be had, and which came to 50 or 60, and even 80lb. weight, is lost at present. And the great cattle cabbage, the great Scotch, the drum-head, and the Dutch, &c. are not distinct varieties. At present, I am inclined to believe, that the best sort to be procured is the large red cabbage. It comes to a good size, and is hardier than most others."

As it is not probable that farmers in general will take this advice, it would however be convenient, were gardeners here and there, within this district, encouraged to grow good plants. Care should be taken that the grower would keep the several species of seeding plants separate, otherwise the mongrel kinds would be the issue.

It is a well-founded opinion, that cabbages thrive best on good soils. We know of but one instance in which they were attempted to be grown on poor soil, in the Glamorganshire coal tract. John Herbert Lloyd, Esq. of Cil-beyll, when he recommended to his tenants the cultivation of turnips, found them stubbornly insisting that they would not grow in their moory soil and high climature, excepting in gardens. Knowing that example was superior to precept, he grew turnips successfully; and then made an experiment on cabbages. A more unpromising soil can scarcely be found, even in the coal tract; not being worth more than 8s. an acre. He however succeeded so far as to procure a crop of 12 tons an acre; which, all circumstances considered, must be superior to 30 tons on the fertile lowlands. Some of his tenants have since become converts to the turnip system.

We regret, however, that this gentleman, after commencing his experimental lectures on tillage so successfully, in a part of the country where they were

[S. WALKER.]

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much wanted; and after procuring so many valuable implements from London and the Lothians, should soon retire from the field of action, and rent his farm to a tenant.

### VIII. RAPE, COLE, &c.

“The culture of *rape* for spring feeding, is perhaps the best sort of green crop for the generality of farms in this county; and I have great confidence that if it was once introduced, and its benefits known, the practice would become general. Rape may be managed to great advantage with very little expense; and it thrives vastly well in this moist climate, without much care or labour. A piece of rough land pared and burned, manured with a moderate quantity of lime, and sown with rape, affords an excellent crop. Barley succeeds well after it—then clover—then oats; or with a slight dressing of muck, or compost of lime and bog earth, barley may be sown without a doubt of success\*.”

Coleseed has been cultivated on an extensive scale by Mr. Mirehouse, on the reclaimed fenny grounds of Castle Martin corse in Pembrokeshire. On that soil it has been found superior in profit and general utility to turnips: it need not be hoed: it is much hardier than turnips, and is not affected by the fly. In this soil it grows from three to five feet in height; so as to shelter sheep exceedingly well. When mangled by sheep, it is not injured by succeeding frosts, as turnips are. But the plants off as bare as possible, they will sprout afresh; and if permitted, will run to seed in June or July. Quantity of seed about 2lb. per acre, and usually the same price as that of turnips.

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\* Original Report of Caermarthenshire, p. 41.

“Coleseed

“ Coleseed is much cultivated in the Isle of Ely, the fens of Cambridgeshire and Lincolnshire, &c. In South Wales there are many tracts of soil of a similar nature; which if drained, and otherwise reclaimed, would produce excellent crops of this very profitable article.”—*E. IV.*

“ Coleseed or rape has been lately introduced by Messrs. Monkhouse and Hutchinson, on Hindwell farm in the Vale of Radnor, to be eaten off in the spring by sheep: its culture as such deserves to be extended; though the cultivating of it for seed is usually forbidden in leases.”—*T. F. Lewis, Esq.*

Rape is highly recommended to be kept for spring feeding in the scarce season, between the later turnips and clover. “ It is known to grow here luxuriantly, and stands the severest winters, even when the common colewort, the hardiest of our culinary plants, had failed. Rape comes in as a green food precisely where the turnips end. Why may it not be sown in autumn, after an early stubble? Seed would not cost more than 3s. an acre. It might be disposed of in time for barley; if not, for turnips in June.”—*Report of Mid-Jothian.*

#### IX. MANGEL WURZEL, OR ROOT OF SCARCITY.

*Beta major, vel altissima.*

Dr. Lettsom's recommendations procured this root an introduction into the Vale of Glamorgan. John Franklen, Esq. of Llanmihangel, has cultivated it for years upon his farm: the soil strong, upon the grey lias limestone, but rendered more friable of late by profuse liming. Mr. Franklen has obtained crops amounting to 25 tons an acre; many of the plants

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weighing 32lb. He never found that any insect injured it either in root or branch. From its saccharine quality, the root is exceedingly nutritious. As it will not bear severe frosts, it is therefore drawn as soon as in perfection, and stacked for use. It is always sown by the drill.

The Rev. Dr. Hunt of Margam, and a few others, have cultivated mangel wurzel upon a smaller scale.

#### SECT. VI.—CROPS FOR MANUFACTURE, &c.

##### I. HEMP AND FLAX.

THESE articles, of such great use in general domestic economy, &c. are cultivated but on a very confined scale in this district. In many parts, the lower classes prefer woollen to linen manufacture, for shirts, bedding, &c.: hence, in some measure, the neglect of growing hemp and flax, and few gardens only are appropriated to their growth.

Hemp is considered as a cleansing crop; its being sown in May, its vigorous growth, and overshadowing foliage, all combine towards the exclusion of weeds. Turnips, notwithstanding, are recommended to be sown with it! but the rage for procuring two crops in the season, should confine itself within reasonable bounds. The soils of some vales in Radnorshire, Vales of Wye, Glamorgan, Laugharne Marsh, and Castle Martin corse, are excellently adapted to the cultivation of hemp.

The late R. Crawshay, Esq. of Cyfarthfa, at the Cardiff Great Sessions, proposed to the Grand Jury to enter into subscription, and form an association for the culti-

cultivation of hemp, which was then become a scarce article, for want of the Russian ports being open. It was agreed that a farm of appropriate soil should be taken, and a certain number of acres of it applied to the growth of hemp.

It is a general opinion, that March is the best season for sowing hemp; hence, the adage—" *Gwell carthion Mawrth no blaenion Mai; i. e.* Better the hurds of March than the prime hemp of May." There is some truth in this, but an early crop is more precarious. Hemp, however, will bear early sowing better than flax, though the reverse is the common practice.

When the male and female hemp plants are nearly of equal strength, and the female considered as not worth preserving for seed, they are both drawn up together, and harvested and dressed for the rind only; but in good crops, the female hemp is commonly stronger than the male\*, and it is expedient to separate them in drawing, both for the sake of stapling two kinds of rind, the male being by much the finer, and also for the preservation of the seed. The male hemp ripens considerably before the female; and the former is carefully picked from among the latter by the hand. For this purpose, alleys are formed at convenient distances, so that from each narrow alley a person can reach to the middle of the intermediate spaces. When the seeds are properly ripe, the female hemp is either drawn or reaped; the latter is preferred when clover, &c. is sown with the hemp, or when the roots are inconveniently strong. It is bound into large handfuls,

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\* Unaccountably, the Welsh confound the sexes in hemp: that which flowers, is by them called *cywardb benyw*; and that which bears the seed, *cywardb gwryw*.

and stacked with the heads together, and covered with straw, to secure the seed from birds and domestic fowls. The heating of the heads, thus stacked, prepares the seed to be easily beat out and preserved for the ensuing year.

In Gŵrdiganshire, we observed a different mode of fermenting the heads to accelerate the separation of the seed, by burying the tops in circular holes, of some feet diameter, cut in the ground; the stems being inverted, and bound together by straw ropes, &c. As to the superiority or inferiority of this mode, we cannot judge: it appears however to be the most troublesome mode of the two. In Cardiganshire, straw is laid about the heads of the bundles to keep out the mould: it becomes ready for rubbing out the seed by the hand in about two weeks (*rhwtto cywarch*). In winter, the stalks are laid leaning against a ditch bank, to imbibe moisture, that the rind may be excoriated. In East Wales, it is laid upon grass lands until the rind and woody part be easily separated: very few lay it in ponds, as they do in England.

Flax requires clean soil, otherwise it will much encourage the growth of weeds. In this particular it is quite the reverse of hemp. Poor soils will produce plenty of seed, though it will afford but little work for the *hecklers*, or *nogmen*\*, as the dressers are provincially called; who, in parts where some quantities of hemp and flax are grown, carry their implements with them from house to house, and dress by the stone weight, having their victuals allowed them. Some parishes in Wales have two or three such men resident.

Flax is commonly sown on the furrow of a clean ley,

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\* In Welsh, *bithwyr*; from *biden*, a heckle.

loamy soil, and harrowed in. The best crop we met with was near Clayrow, in Radnorshire. Time of sowing in April.

Hemp requires better soil, a fuller or finer tilth, and seems to delight in compost manure formed of the scrapings of yards, folds, roads, &c. This is commonly spread on the surface, and harrowed in with the seed. Sometimes light dung, &c. is spread, as a cover to preserve the seed from the feathered tribe. Cottagers at this season frequently present their scraping fowls with a pair of shoes each. Time of sowing about May-day, old style.

Foreign hemp seed has a glossiness of coat superior to ours, which must be owing in part to a better method of harvesting. The heat occasioned by green-stacking and inhuming, destroys the gloss; but the seed cannot be preserved in the open air without nets, &c.

Flax seed, by being repeatedly sown on soils not the most genial to its growth, degenerates in quality; it is therefore necessary to apply to seedsmen once in six or seven years for new seed.

Many more varieties upon still more minute scales, may have escaped our observation. A writer in the *Agricultural Magazine*, No. 55, p. 105, under the signature *Virgilius*, however, attracted our notice. Beginning with Gothic antiquities, he describes, rather floridly, the spirit of emulation and enterprise extending itself into a part "so remote from the capital" as Radnorshire. He there found a small farm cultivated in rather a scientific way, and with articles uncommon in that country; "particularly two large fields of the *lecteola* or *weld*, of which," he believed, "but little is grown in any part of England, except Kent." He apprehended "the neighbouring counties of Gloucester,



ter, &c. may soon find the benefit of being able to procure the above article at a cheaper rate than sending to London for it." He also there found "*canary* ripening well, *caraways*, *turnips* of every sort, the *papaver alb*," and the planter was "about attempting to procure *tournsol*."

Virgilius's account was published for Feb. 1804. We had seen the farm he alludes to in June, 1802. There were then, as represented to us, about three acres sown with chicory; and, unfortunately, in another excursion, subsequent to that of Virgilius, we found that all had vanished, "like the baseless fabric of a vision, without leaving a wreck behind." The scene was near Clayrow, in Radnorshire; a tract by no means "mountainous," nor "barren."

We apprehend that it is the true woad (*isatis tinctoria*) that is cultivated in Kent; and was without a doubt attempted to be grown near Clayrow; but if Virgilius, by "*lecteola* or *weld*," meant the *reseda luteola*, wild woad, or dyer's weed, it is a plant of a different class. The wild woad (*reseda luteola*) is rather a common plant, especially where virgin mould has been thrown up, in the formation of roads, canals, buildings, lime-kilns, &c.; mistaken for the true woad, it has been collected by the country people, and offered on sale to the cotton-dyers, who refused it, without telling the reason why: this was wrong, as it tended only to exasperate John Bull against manufactories among all novel institutions.

## II. HOPS,

Are growing wild in many places, but generally near dwellings, ruins, Whitland Abbey, &c.; which, though



though now neglected, prove their former culture, upon a small scale, for home use.

About ten years back, a few small hop-yards were planted in the valley of Aeron, in Cardiganshire.

In the Vale of Wye, both in Brecknockshire and Radnorshire, are several extensive hop-yards, managed in a similar manner to those in the neighbouring hop-counties.

## CHAP. VIII.

## GRASS LAND.

## SECT. I.—PASTURES.

AS these had existence prior to meadows, they take the lead.

The quantity and quality of grass depend on the nature of the soil; and soil is either rich or poor, according to the various admixtures of ingredients which compose it.

The best grass is, of course, in vales of some breadth, and at some distance from the source of the river, which is a general appendage of every valley.

Near their sources in the hills, valleys are commonly dry, and the soil gravelly, unless the fall be so obstructed as to occasion the lodgement of water; in which case, a clayey, rushy soil, bog, or turbary, is the consequence.

By a correct map of the rivers of a district, with a scale of their fall in a given number of furlongs or miles, and of the mountains from which they flow, and those distinguished by kinds of "quality colours," a geologist might give a fair estimate of the quality of the soils and grasses of the respective valleys intersecting that district, though anomalies frequently form exceptions in valleys as well as on sideland places. Adjoining narrow valleys, pasture pieces somewhat elevated

vated above the flat, and of a mean or gradual slope, frequently produce grass of a more feeding quality than that on the adjoining level: this must be owing to the sideland ground retaining its primitive deposition, whilst the level had received subsequent depositions of gravel and other inferior ingredients.

Sound soils, formed from hills affording fertile materials, or from hills not containing the best ingredients, but being at a distance, and so situated as to be periodically overflowed by the turbid waters of floods, and those not rapid, produce grass of the best quality, and constitute what is commonly termed *feeding land*. This quality in some vales is more general than in others apparently equally circumstanced. A, may be a piece of pasture of the first quality; B and C, one on each side of A, apparently of the same kind of soil, and under the same kind of treatment, may nevertheless be much inferior. This may be owing to the original formation of the substrata; and were the three pieces bored to a certain depth, the occasion of the difference of pasture might be discovered, both by the depths and analysis of the respective soils. A, may have had originally a concave surface, and B and C both convex; the floods of ages would deposit sediment in A, before B and C would be in a situation to retain any; that is, until A would be filled up, so as to be on a level, or nearly so, with B and C.

A piece of only four acres, on the banks of the Windrush, not far from Burford, in Oxfordshire, is said to be remarkable for the superiority of its feeding quality, compared with the surrounding land. The same theory, including additions from decayed vegetables, accounts for the rich quality of drained marsh lands.

Grass is seldom permitted to grow exuberant on  
such

such soils; they are kept comparatively bare by stock, and yet the animals fatten. The excellence of the soil consists in being for ever growing, during the growing season, and thereby the grass is always young, tender, and highly nutritious. Inferior soils, to appearance, have frequently a superabundance of grass, which nevertheless will only maintain cattle in store condition, the grasses being of coarser kinds, more husky, and less palatable.

Inferior land requires the auxiliary aid of the aftermath of meadow ground, turnips, hay, &c. to fatten cattle: of this sort, in general, are the minor valleys.

The proportion of good feeding land, to that of pasture in general, is very small in this district. The lower part of the Vale of Wye, partly in Radnorshire, but mostly in Brecknockshire, affords excellent pastures.—“An acre and a half will fatten a beast of 60 stone (12 lb.) in six months; some sooner, some later, according to difference in the animal constitution.”—*Rev. Mr. Powell.*

The Vale of Usk, from above Brecon to Buckland-house, and from below Bwlch Arllwys to the borders of Monmouthshire, exhibits pastures more beautiful than rich; the soil being considerably lighter than that of the Vale of Wye.

An extensive tract in Glamorganshire, from Romney river on the east, to the boundaries of the Vale of Miskin, including the fertile banks of the Taff and the Ely, affords excellent pastures. The grassiness of the Vale of Miskin has given rise to the old adage, “*Brp Miskin am borra,*” &c.

The lias limestone tract, from Lantwit Major, by Boverton, Gileston, Fonmon Castle, to the mouth of the Ely, near Penarth harbour, produces grass of excel-

lent

lent quality. The pastures in some places appearing bare, is their commendation; their quality is evident from the fine large cattle they rear and feed.

The white limestone tracts of the Vale of Glamorgan, Gower, and Castle Martin in Pembrokeshire, have pastures differing in quality from the foregoing: the grasses are exceedingly fine; many old pastures are almost entirely covered with the natural white clover in the greatest abundance: even the open wastes have the finest herbage imaginable, consisting chiefly of white clover, sheep's-fescue, poas, and dog's-tail grass, &c.; but the substrata being so porous, or rather so full of crevices, that the soil has not commonly that cohesive-ness of texture which characterises pasture land of the first feeding quality.

In Caermarthenshire, the celebrated and beautiful Vale of Towy justly claims precedence: it possesses great capacity for producing excellent grass, from Llangadock down to Caermarthen; and thence still improving in fine marsh lands, some improved, and much more to be done, by draining, &c. to the mouth of that noble river near Llanstephan.

Mr. Hassall, in the Original Report of this County, (p. 39), taking into consideration the humidity of the climate, and the impoverishing system of tillage pursued by the generality of farmers, expresses his sentiments in the following terms:

“ It is mortifying to see the fine lands of the Vale of Towy, and other fertile tracts, driven by the plough to the most deplorable state of sterility: more than half the Vale seems reduced to this condition; and much of its surface may be seen in the extreme of poverty, whilst adjoining lands, of precisely the same quality, are clothed with a pleasing and profitable verdure.

“ Every



"Every occupier, before he begins to improve a piece of land, will consider the quality of its soil, and for what purpose it seems fittest. There is one line of conduct, which seems so decidedly applicable to the vale lands, that I presume no difference of opinion can exist upon so obvious a matter; namely, that of *laying down the lands to grass, and occupying the whole in dairy and breeding.*"

Mr. Hassall's opinions are generally such as claim our highest respect. We however wish, in this instance, that he had given his advice for the improvement of the tillage of the arable lands of the Vale of Towy, rather than advising them to be indiscriminately thrown into permanent pasture. The markets were low when Mr. Hassall wrote, and he may since have changed his opinion upon this subject. The extremes of dearth, and indeed of scarcity, which the inhabitants of these realms endured after the harvests of 1799 and 1810, have surely given us sufficient lectures upon the extreme bad policy of converting arable land to permanent grass, upon any considerable scale. Extensive enclosures of wastes, those wastes arable, and manure procurable, may warrant a proportional reduction of the present quantity of land allotted to tillage in the vicinity of those enclosures. Without this, the population of the Vale of Towy, &c. would find it always inconvenient, and sometimes difficult, to import from other parts the necessary quantity of grain for their support, unless unfeathered bipeds can be brought to subsist upon grass as well as quadrupeds. But to return :

Laugharne Marsh consists, on the land side, of soil of a proper consistence for producing grass of the first quality.

The

The banks of the Tawe, from Laugharne to Whitland, &c. are grateful to the grazier and breeder.

The Vale of St. Florence, and the red soil tract obtruding into the white limestone tract of Castle Martin in Pembrokeshire, produce nearly a perennial herbage. The remaining parts of the county produce grass of a secondary quality.

The Cardiganshire valleys, after some egress from the hills, and attaining some expanse, consist of loamy soils, producing the sweeter species of grass. Nevertheless, it is said that lands, far from being of the first quality, manured with shelly sea-sand, produce grass of such excellent quality, that cattle bred upon them will fall off, or shrink in condition, on the best natural pastures on the banks of the Teivy. "This has been proved."—*Rev. T. G.*

The best pastures are commonly held sacred; the plough never enters them. It is a true though a trite saying, "That rich land makes lazy farmers." Much pasture land of this description lies in a very neglected state. Mole-hills, left for years undisturbed, become convenient nests for ants, &c. The larger ulex (*furze*), hawthorns, brambles, all contribute to lessen the value of the richest land. Docks are sometimes cut, but thistles very seldom; but there are, fortunately, exceptions to bad as well as to good rules, where pastures are dressed as regularly as meadows.

Inferior pastures are not, in general, so much neglected. Like importunate beggars, they must have something, otherwise the farmer suffers. They become mossy, hide-bound, &c. and require manure, and periodical alternations of tillage.

The grasses of the best vales are such as are noticed elsewhere on similar soils; and so of every gradation of soil

soil and elevation, to the character and extent of the highest hills.

The grasses that will fatten best, are for sheep being the best for the purposes of the dairy, especially for the production of butter. This will be further treated in Sect. *Dairying*, Chap. *Live Stock*.

## SECT. II.—FOGGING OF PASTURES.

This is an ancient Welsh practice, and is still continued in many parts of South Wales.

T. Lloyd, Esq. in the Original Report of Cardiganshire, p. 17, calls it a “beneficial practice.”—“Our upland ground being so dry and sound, that no animal can in the wettest weather make an impression on the surface, and naturally running into white clover and good grass; when not too much exhausted, it is the practice with many to set apart many acres for *fog*; the expression is I believe provincial\*; but the process and advantages of the system I will lay before you. As early in *May* as we can, the fields are shut up for the summer season, with no other intention than eradicating dock, or cutting down thistles, &c. In that state they continue until *November* or *December*; when all the stock is turned in, and every animal is in excellent condition, without the aid of hay, straw, or oats, and the butter is as good as in any part of the

\* It is a term to be found in most dictionaries. *Walters* defines it to be grass, neither mown nor grazed. *Balcy* sillily derives *fog* from the Italian. In some parts of North Wales, lodging old grass, is termed *fury*, and *fog*—*foggers*, any dry husky stuff, and for that reason applied to tobacco.

year. The frost sweetens the grass, and snow does not injure it; but while it is buried, dry food must be resorted to. In the spring of the year, young shoots of grass are very forward, under the shelter of the old, and both together are eaten with avidity. The land which was before mossy, from being over-stocked and grazed too bare, is soon filled with palatable and abundant food, and the moss disappears without the aid of the plough, or surface manure; it betters every year, and I am inclined to think the best acre of hay will not keep more stock, or in such good condition, as an acre of fog, with the additional advantage of avoiding the risk, and saving the expense of hay-making and manure."

On the above writer's demesne at Kilgwyn, some years after his death, we saw a piece that had been *fogged* successively for sixteen years; and according to the tenant's information, was improving annually.

Mr. Hassall, in the Original Report of Pembroke-shire, pp. 13, 36, coincides in opinion respecting the utility of fogging.

P. 13. "The practice of what is provincially called fogging, or keeping the land without stock from *June to March*, which the mildness of our winter permits without detriment to the grass, is found to assist the young pasture in a very extraordinary manner; nor can too much be said in support of a practice so obviously advantageous to the dairy-man and the breeder."

P. 36. "The next practice in the agriculture of this county, which I can venture to recommend to other counties, is that of *fogging* grass lands; that is, letting the grass grow from a fortnight before Midsummer, and not turning any stock upon it till February or March. By this practice, the farmer provides a

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good stock of keep for that season of the year when he stands most in need of it; puts his cows into good plight for calving, saves a great deal of hay, and improves his grass lands by the quantity of seeds shed upon the surface by the fogged grass; his stock being out by day upon the fog, and in his straw-yard by night, augments his dung, which is the main-spring of his tillage management; and he gains, in a great measure, the advantages of a green winter crop.

“The practice of putting cattle from fog-fields into a straw-yard at night, is so obviously advantageous, that I wonder any sensible farmer can overlook it; but the fact is such, that very few attend to this profitable and easy method of increasing the dunghill; and by letting the cattle lie all night upon the fogged grass, it is materially injured. The moisture of our atmosphere, combined with the grassy tendency of the soil, renders fogging particularly convenient.”—*Mr. Hassall.*

“When land has been mowed too long, one year's fogging is supposed to recover it. Mossy pastures are benefited by it. It clears pastures of thistles, dock, &c. by chiseling them just below the surface, when in blossom, (*yn eu gwenwyn*) the fog prevents their second growth from the root, which would take place more readily in bare grazed pastures. Fogging replenishes the soil with seeds, that by this means are suffered to ripen and shed on the ground. A crop of winter or spring fog is as valuable as a crop of hay; it affords comfortable food and bedding for ewes and lambs in the spring; and it is said that two years fogging will recover lands, let them be ever so run out by tillage or mowing. Cattle used to fog, will quit hay that may be given them, and clear away the snow with their  
their



their feet to get at the fog. The fields proper to be kept in fog, must be of a dry, sound, and close soil; the argillaceous rather than the siliceous principles should prevail in it; but not so much as to be over retentive of water. Soils that are too light also, *eat up the fog*, as the country people express themselves, early in winter. The truth is, on such soils, the fog withers and dries up too soon, and falls down and rots before the season that requires it arrives. Any sound, and rather strong but dry loam, is proper for fogging. Red loams, are said to be peculiarly proper for fogging.

“Some have recommended the putting of cattle from fog-fields into straw-yards at night, for the purpose of increasing the dunghill; others contend, that one main purpose of fogging is the improvement of the soil, the cleaning it of moss, and the enriching of it by the dung and urine of cattle; thus expending on the field the manure derived from it, leaving on it what is justly its own;—not doing this, the improvement of the field is imperfect.”

“Fogging is now mostly confined to Pembroke-shire, part of Cardiganshire, and those parts of Carmarthenshire which join the two former counties. It was formerly in vogue in the Vale of Glamorgan, which will be further noticed in the Section on *laying down in grass*; and is still practised by a few in the Vale of Miskin, Gower, Llangysfelaeh, &c.”

“A Mr. Carne, formerly of Nash, in order to clear an old pasture of ant-hills, got them excavated in winter, and applied caustic lime profusely to destroy the ants; in spring, dung was put in each excavation, the compost placed upon the dung, and a cabbage plant, or more, according to the size, was dib-

bled into each, to be eaten with the pasture by cows, &c. The scheme succeeding to his satisfaction, he took the hint of planting cabbages in fields kept up for fog."—*E. W.*

"Fogging is highly spoken of by some, and with disapprobation by others; both parties however admit, that the soil, and following summer's grass, are benefited it. One gentleman farmer, between Haverfordwest and Milford, spread a little dung on a fog-field in January, during a frost; this rotted all the fog, and the following summer he had a larger crop of hay than ever was known."—*T. W.*

"Fogging is getting out of repute: it must have originated in chance, and want of a summer stock of cattle, &c."—*T. Jones.*

Some of the most valuable discoveries trace their origin from *chance*; and if fogging be an *improvement*, as more than nine out of every ten contend that it is, it is the cheapest of all improvements; but what militates against its becoming more general, on lands not convenient to be manured by other more common methods, is, that it will not as well suit inland counties, where the winters and springs are more severe, and cattle habituated to warm lodgings until they are turned out to grass in April or May. In such situations fog should be depastured either early in winter, or late in the spring; and of the two seasons, the latter ought to be preferred, for various reasons; and chiefly, because that season is frequently the season of the greatest scarcity; especially with such farmers as keep a stock of ewes and lambs. A piece or two of good fog at this season, when the turnip crops are exhausted, and new grass, clovers, &c. not yet luxuriant, must be of a value that can scarcely be too high rated.

The

The *rouen* of English and Irish husbandry is to be discriminated from the Welsh *fog*: by the former is to be understood the aftermath, or second growth of grass *after mowing* the hay in July, preserved from every species of stock until the spring months, and even so late as April and the beginning of May: by *fog* is understood the summer's grass preserved until the following spring, and sacrificing the crop of hay.

"*Aftermaths* of grounds mown in June or July were also formerly in Glamorgan kept up for *fog* in winter; but the *fog* of unmown grass was deemed the best in itself, exclusive of the hay crop."

*Fog* (on unmown land) may be depastured with some advantage in winter; but *rouen*, or preserved aftermath, should not be touched until the above prescribed time in spring. In eating off the *fog* early, there is nothing but *fog* to be had; in leaving it to remain until the springing season, it will be half old *fog* and half new grass; and that at a season when there is no new grass to be had elsewhere. The cause is obvious.

*Rouen*, or preserved aftermath, seems best adapted to sound vale land; and *fog*, or preserved summer grass, to uplands of less productiveness.

"*Fog* seems to improve upland pastures, by smothering the moss (*muscus*) which monopolizes the surface; and the grass roots, partly by protection from frost, and partly probably from respite or rest, recover strength. Some pretty writer, his name not at present remembered, says, that "if ground be covered with straw, fern, &c., that under such covering nitre will be generated, which will greatly fertilize the land."—*Query*, therefore, whether land covered with *fog* does not generate nitre?—if so, whether that be



not a principal cause of the increase of fertility?"—*E. W.*

*Fogging of Aftermath.*—Mr. Clark, in the Original Report of Brecknockshire, p. 47, writing on irrigation, says—"they generally feed their bees upon the lattermath grass of their meadows, without sacrificing this grass; therefore they are prevented from turning the water on the land so early in autumn as they could wish.

"An intelligent farmer observed, that notwithstanding he valued his lattermath crop at 15s. an acre, yet he found, that the cheapest manure he could dress his meadows with, was to sacrifice this crop once in ten or twelve years, by turning on the water in August, or whenever a flood happened after a long drought."

A person having a lease of only one meadow, sold off the crop of hay every year, and let the aftermath to be grazed; having no manure to bestow upon it, the crops of hay at length became very scanty. He then sacrificed the aftermath successively for two years; by which means the former fertility of the meadow became restored.

"In rank pastures, large patches would remain in thick fog, untouched by cattle: these remained over winter: in February or March, it was customary to sprinkle black oats over such pieces of fog, and stir them with a rake, or light harrow. The oats would grow up among the fog, and cattle when turned in would eat both with avidity; thus, at the expense of a few oats, having additional fodder, and improving the future herbage."—*E. W.*

In a piece of pasture where ploughing and mowing were prohibited, the *dactylis glomerata* (rough cocksfoot

foot grass), *holcus mollis* (creeping soft-grass), &c. under shades of trees, and around the borders, produced an herbage that was always refused by every species of stock. A new tenant turned out his stock into this field a fortnight earlier than the usual time in spring, when the stock devoured with avidity every green blade, and thereby sheared the piece as close as a bowling-green. The field became at length so improved, by continuing this early grazing, as to bear being grazed down bare three or four times from April to August.

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### SECT. III.—MEADOWS.

THE finer meadows, will in general be found interspersed in the tracts already described as producing the best pastures.

The hay of grasses growing spontaneously, may be divided into six kinds :

1. *Gwair gweirglawdd*\*—i. e. hay from fossed meadow ground.

*Soil*—Of inferior kind ; seldom capable of profitable tillage. Clay of various hues—yellowish, bluish grey, whitish grey, &c. Subsoil commonly rammel : sometimes the soil approaches a clayey loam, and sometimes, on both flats and sidelands, a thin surface of meagre peat lies upon the clay, &c.

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\* The laws of *Horeb*, in the tenth century, give an explicit definition of the term : "*Sef yw gweirglawdd, tir difrwynt na myn ei twair, a cbbawdd yn ei gylch*;" i. e. by a meadow is meant, land unprofitable saving its hay, with a foss surrounding it.



*Situation*.—1. On flats, especially those of table-land; 2. On sidelands, or undulating surfaces.

*Grasses*.—Such as are natural to cold soils.

*Crop*.—Coarse, but bulky when well managed; commonly appropriated, where there is a choice, to the feeding of horned cattle.

*Improvement*.—The surrounding and intersecting fosses should be periodically opened, and the soil, &c. thrown up, formed into lime or dung-compost, to be bestowed, when well mixed and pulverized, upon the interior. Covered-drains are useless, unless where springs appear. Small surface-drains, at proper distances, and in proper directions, formed by a two-coultured plough, cutting and throwing out a clean split, and leaving a furrow of the shape of the roman V, are necessary, to take off the rain water, which lodging upon the clay, checks the growth of the better grasses: the splits should be collected into a heap for compost, and the old furrows, impaired by moles, poaching, &c. should be cleared every autumn. If the headlands be higher than the interior, they assist the retention of water, which produces rushes, and should therefore be ploughed, and either made to produce a crop or two, potatoes, flax, &c. or formed immediately into compost, to be disposed of on the interior, as before. Shovellings of yards, roads, &c. lime-composts, ashes, &c. are excellent manures for such lands, when superabundance of water is expelled.

The irrigation of such meadows, where practicable, ought to be undertaken with caution and good advice. The water should be of the turbid kind, so as to deposit a manuring sediment. Meagre water from clays, turbaries, &c. should be avoided; and although the trenches formed for irrigation, tend to drain as well as

to irrigate, yet the former effect may be insured by the open furrows recommended above.

2. *Gwair Doldir*—i. e. hay from dry loams.

*Soil*.—Varieties of loams, sandy, gravelly, or clayey, but the latter seldom so far as to be over retentive of water; and in valleys, a bed of gravel is generally underneath. In some places, the term *doldir* is applied only to a strong loam; though varieties are described by the additions *trom*, and *ysgafn*, heavy and light.

*Situation*.—*Dôl* in Welsh, commonly signifies a dry piece of loamy soil, either in hay, pasture, or tillage, as it is convertible into either, and commonly upon a flat, by the side of a brook or river. *Dôl* is a common appellation, and generally agrees with this description, excepting in cases where it is ironically or catachrestically applied, as in *Dolydd Ceiriog*, a highland tract in Denbighshire, the very reverse of the above definition.

*Grasses*.—According to the ingredient which predominates in the soil, but generally of the best sorts.

*Crop*.—Fine; bulk according to quality and treatment: the hay, where there is a choice, is given to all species of stock indiscriminately.

*Improvement*.—Surface-manuring; irrigating where practicable, and no land in general more so, owing to situation, fogging, and occasional tillage.

3. *Gwair Gwyndon*, or *Gwyndwn*—i. e. hay from dry arable land.

*Situation*.—This differs from *doldir* in very few particulars, only that it is considered applicable to dry

dry sidelands, and pieces of undulating surface, to which *doldir* generally is not.

*Soil*—Commonly what is called hazel mould, ferny soil, or soil capable of producing fern, when neglected. In the Vale of Glamorgan, &c. it consists of varieties of loams.

*Grasses*—Of the sweeter earlier kinds, if the land is in good condition, otherwise it is crowded with weeds.

*Crop*—Nearly the same as that of No. 2, but commonly less. This hay is usually preserved for horse-fodder, where clover and rye-grass, &c. are not provided; where they are, it is given to milch cows, young stock, &c.

*Improvements*—Same as those in No. 2.

4. *Gwair Rhosdir*—i. e. hay from uplands, moors, &c. provincially termed *rosses*.

*Situation*—Generally elevated, and climate cold, especially in the slate and coal tracts.

*Soil*—Clay on rammel, &c. frequently with a surface coat of crumbly peat.

*Grasses*—*Carexes*, *scabiosas*, &c.

*Crop*—Generally very scanty, though abundant in sheltered situations.

*Improvements*—Same as those for No. 1. Composts to increase the staple, have a desirable effect. These hay-grounds are frequently coated with spongy mosses retaining water, so as to counteract evaporation. The surrounding fosses should be kept open, and intermediate ones formed, as in No. 1. Draining without *real* springs, and irrigating without turbid water, are only the ghosts of improvements upon these lands. Paring and burning the coarse and sour sod, liming, tilling,

tilling, dunging, and laying down after the second crop, in the Evesham method of broad-ridging, are perhaps the only foundations of permanent improvement.

In places convenient for irrigation, and where it is advisable, the ridges should be formed in such a direction as to take the water, upon a proper level, along their crowns or summits, and dispose of it into the *reens*, in what is called "Boswell's *floating method*."

Where lime is cheap, so as to be applied copiously as a top-dressing, its effect has been very visible on this kind of land, even when not properly prepared for it.

5. *Gwair Mawndir*—i. e. hay from turbary soil, or peat.

*Situation*—Flat in general: when sideland or undulating, the peat in general is not so deep, and is sometimes so shallow as to come under the definition of No. 4.

*Grasses*—In the state of nature, heath, rushes, aquatic plants, shrubs, &c. When cultivated and put down in grass, the *holcus lanatus* (meadow soft-grass), &c. prevail.

*Improvement*.—Drain where requisite, pare and burn, lime, &c.; crop with rye, turnips, with dung, oats, rape, &c.; level the inequalities, if any; lime again before laying down, to convert the peat into fertile mould. For composts to be laid on the sward, such substances should be chosen as would add solidity to the surface; even sand, gravel, shale, &c. are not to be despised. Crumbling shale of a pale grey colour, either sandy or soapy to the feel, that falls on exposure



exposure to the air, with clod or unslaked lime in alternate layers; watering the lime in dry weather, as the heap is made; left for a time, that the lime may act upon the shale, and then turned over and well mixed, would form a good top-dressing, where a better is not at hand. Craggs of this kind of shale are sometimes found either upon or adjoining turbary soils, &c.: where these, or similar materials, are at a distance, carriage will become too expensive.

6. *Gwair tir dæfredig*—i. e. hay from irrigated land.

*Situation*—Wherever proper water is convenient.

*Soil*—Any kind, when well prepared, and the water improving.

*Grasses*—According to the soil, but generally the coarser kinds.

*Crop*—Double the original in bulk, especially on the soils Nos. 2 and 3. The Nos. 1, 4, and 5, are not much benefited by watering, unless the water be impregnated with particles of manure, and it is but seldom they are conveniently situated for such water.

Though the crops of irrigated land are much increased in quantity, yet that increase is commonly obtained at some expense of quality: irrigation therefore is more profitable for innkeepers who feed the stock of others for so much per head, than for farmers who feed their own stock, especially when moist harvests happen.

The bays Nos. 2 and 3, are the most delicious, and also most nutritious, as those who have made experiments in fattening cattle, &c. can testify.

Nos. 3 and 6, are soonest damaged by wet weather; No. 4, consists of hardy grasses not easily injured by wet:



wet: scantiness of crop, and airiness of situation, contribute to its preservation. Its quality as fodder, is said to be much superior to its appearance; but the dung of cattle fed upon it, seems to have less of the carbonaceous principle than that obtained from any other hay; it is consequently of less value as manure: the best hay for this quality, as well as every other, are Nos. 2 and 3.

John Bull, though in general a blunt honest character, yet betrays some duplicity in the declaration of his sentiments respecting the quality of different kinds of hay. He is well acquainted with the superior excellence of the hay No. 3; it is therefore the best for his team-horses;—and Mrs. Bull is persuaded, and she is no great botanist, that the hay No. 1, and even the hay No. 4, are the best for her dairy cows, &c.

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#### SECT. IV.—ALTERNATION OF MEADOW AND PASTURE.

SOME of the more useless and strong plants, encouraged by letting lands continue long in pasture, are checked, and considerably diminished, by converting such pasture land into hay ground. In some tracts, such as the Vale of Glamorgan, &c. there is but little difference, in the quality of the soil, between pasture and meadow: some distinction, however, leads to fix the farmer's choice. The best meadow grounds are retained as such; others undergo periodical alternations from hay to pasture, and the reverse. This however is not advisable beyond annual alternations, without consideration. In this respect, land may be said to

to acquire something like habit in animated beings. Meadows mown for a series of years, and well managed, commonly produce the greatest crops of hay; and pastures grazed for a similar period, will feed the greatest number of stock, regard being had to quantity. The reason of this seems to be founded on the difference of grasses in old pastures and old meadows. Those which abound in old fine pastures are, commonly, white clover (*trifolium repens*), sheep's-fescue (*festuca ovina*), dwarf meadow-grass (*poa annua*), sweet-scented vernal-grass (*anthoxanthum odoratum*), crested dog's-tail (*cynosurus cristatus*), &c. &c. These, in a moist climate, are continually springing in the pasture; but when the land is kept for hay, it will not for the first years produce a bulky crop. Nevertheless, by repeated annual mowings, the coarser and stronger grasses will begin to prevail, and the former fine pasture grasses will gradually disappear. Reverse the order, and the effect will be the same in converting old meadow ground into pasture.

We knew a tract of commonable waste land, consisting of soil of the richest quality, and heavily stocked winter and summer: an Act was obtained for its enclosure, among other wastes in the same manor: some parts of it have ever since been kept for hay, which is far inferior to that from poorer soils under different circumstances. Such persons as are under the necessity of keeping such land in hay, should persist in mowing the same ground annually, as occasionally depasturing it will tend to prolong the period of its attaining the true character of meadow. Tillage would cure it; but that cannot be risked, owing to inundations. A sward-dressing of lime in April, or beginning of May, might be of service, in destroying

some

some of the most delicate roots, and thereby lessening the superabundance of herbage, which expends itself in an over-thick crop of no great length, the stems being so fine, and thickly matted, that they begin to rot underneath before the proper season of mowing. The richest soils elsewhere, which have for ages, or from the creation, produced pastures of a fattening quality, are far reduced in value when kept for hay, owing to the same circumstances as those of the enclosed waste above noticed.

*Dressing and Weeding.*—The most approved time for laying on dung, or compost manures somewhat dense, is immediately after the crop of hay is off; that is, between the “two harvests,” or, if that season lapses, early in winter, when the aftermath is grazed, and frost happens, that the surface be not injured by the wheels, &c. Lighter composts, ashes, &c. will do any time from Christmas to March. The coarser manures are dressed with bush-harrows, thorned hurdles, harrows inverted, rollers, &c.

Field-rakes for dressing mole-hills are common, and consist of four flat iron tines in a wooden head.

Docks are eradicated with spades, mattocks, pronged levers, &c. Strong loamy soils are in some places much overrun by the butter-burrs (*tussilago petasites* & *hybrida*). In the Vale of Radnor, we observed from one-eighth to one-fourth of fine meadow ground covered with their umbrella-like leaves. On land where a course of tillage is not advisable, some method to destroy them ought to be adopted.—*Query*, whether chopping them repeatedly below the surface, with sharp-pointed hoes, at their first appearance in spring,

spring, and then applying caustic lime, would not check, if not destroy them?

"In pastures that are full of thistles or other weeds, wait until they are in their full blossom, but no seed formed; then mow them, and give a sward-dressing of quick-lime." "*Hyn a'u lladd nhwy yu eu gwenwyn.*"—E. W.

Another plant, a great invader of meadows and pastures, on varieties of loamy soils, is the common knapweed (*centaurea nigra*). In the Welsh botanology it is called *y bengaled*, hard-head. Its propagation is said to be encouraged by imperfect or random watering. It frequently occupies considerable portions of fields whether in pasture or hay; and unless the stock be half famished, it is seldom touched in either state. Tillage is the most approved method of getting rid of it; for though it comes up pretty easily from the root, yet this mode of cleaning it is too tedious.

The *scabiosa succisa* (*devil's bit*) in Welsh *y benlas*, or blue-head, occupies inferior soils on cold bottoms, chiefly in the slate and coal tracts. This plant is not to be considered so much a weed as the purple-flowered knapweed; as the former is more regularly distributed over the ground on single stems. Dairy-women say that the soils producing it, are the most productive in milk, though the appearance be coarse and unpromising. This land, brought under tillage, and well managed, bears cropping with less injury to itself, and with fewer weeds, than soils of higher value in the surveyor's rental. The *devil's bit* seldom makes its second appearance, when the land is laid down in grass after a course of tillage. The same kinds of soil, but somewhat drier, produce the dyer's broom (*genista tinctoria*)



*tinctoria*) in abundance: this is called in Welsh *aur-tanadl*, or the golden broom.

*Grazing Hay-grounds too late in the Spring.*—"I look upon the detestable Welsh sheep, in being the occasion of leaving stubbles unploughed until spring; in having the run of meadows and pastures until May, and in breaking into turnips and young clovers; as checking improvement more than any thing, to the great injury of both landlord and tenant."—*Sir Edward Hamilton.*

"Too generally sheep graze the hay-grounds too late, till the latter end of April or beginning of May: in dry summers, deficiency of hay is the consequence. Hay is also left too long before it is mowed; the stalks are dwindled into mere bents, *sans* taste, *sans* every thing. When the hay is of full growth, when the stalks arrive at full maturity, and put forth their blossoms, then mow."—*T. Jones, Esq. in Brecknockshire.*

Farmers, like other men, give reasons for things the most unreasonable, and frame excuses for things the most inexcusable: the apology which we heard between the Wye and the Usk, from Aberlunvey to Bwlch Arllwys, was this—"That unless the meadow-ground (consisting of varieties of loam, from light to clayey) was depastured with sheep, &c. in May, the hay would be too coarse, and full of "*pengaled*," (*centaurea nigra*); but the growth of this weed might be checked by an annual alternation of hay and pasture, if grazing conduces to the check more than mowing; or completely prevented by a course of tillage; and few soils, naturally producing that plant, are incapable of profitable tillage.



## SECT. V.—HAY-HARVEST.

ON warm soils, early kept hay is mown in June; the more common season is during July; and the rosy meadows of the uplands continue growing till late in that month, or the beginning of August.

Lazy labourers have long ago expressed their wish, that some skilful mechanics would contrive the means of transferring the labour of *thrashing corn*, and *mowing hay*, from *men* to *horses*. As to the former laborious operation, the Jove of Invention has some years back listened to their prayer; but the latter part of the request has not yet been granted: *hay is still cut with scythes, by the labour of men*.

The method of mowing *inward* is practised in some instances; but as it is inconvenient for several mowers to follow each other, and as the kicking out of the swath in returning, renders it less capable of resisting the effect of rain, this mode is becoming less frequent, and mowing *outward* is the common practice, in both lowland and upland situations.

Precariousness of weather, frequently deters farmers from commencing harvest when the hay is in a fit state. Some trust to Providence, and mow in showery weather, that they may have the hay ready to be *made* when fair weather returns. By this latter method we have known farmers to have secured their whole crop in good order, whilst their neighbours, who waited for good weather to *mow*, had rainy weather to *make* their hay, by which it was much damaged. A strong crop of hay in swaths will bear rain for some days, without much injury: it is intermediate hot gleams  
of

of sunshine that cause the greatest damage to both hay and corn, during wet harvests.

Scythe-makers are made acquainted with the destination of their ware. Were the lowland scythes sent into the rosy uplands to mow what is provincially called iron-grass, they would all be sent back, as neither the shape nor the temper of the metal would be appropriate. The upland scythe is very keen and wide-set; and some mowers boast of their being able to cut, or rather shave, a square perch, at one stroke. Some active men will cut a circular swath, by turning on one foot as upon a pivot.

There are various opinions respecting the best method of *harvesting*, commonly called *making* hay.

The hay-maker's day begins, in fine weather, as soon as the dew is perfectly evaporated. Some farmers tedd the first day as much hay as had been mown before ten o'clock, and put it into cocks that evening; what is mown after ten that day, and before ten the following day, is teded the second morning, and so on to the end of mowing.

Others ridicule the idea of cocking any part of the first day's math in the evening of the same day; therefore their practice is, "mow and tedd the same day, leave the hay open for the night, windrow and put into small cocks the second day; spread and put into larger cocks the third day; spread, collect, and carry, if convenient, the fourth day." We found this to be the practice in Glamorgan, west of Ogmore. If they consider the putting of the first day's math into cocks that evening as useless, then leave the swaths unbroken until the second day, rather than exposing the spread hay for the night. The method of making hay in

*Pembroke below the mountains*, seems to be still more reprehensible.

"I do not observe in Mr. Hassall's Report any thing said of hay-making. Nothing can be much worse managed than it is in this part of the county. The grass is generally thrown about in a very slovenly and idle manner, soon after the mowers; it lies in that state a day or two, is collected into small cocks, in which it continues another day; these are again opened and spread, and soon after it is drawn to the stack, and is generally of an inferior quality, from its being so long exposed abroad to sun, dews, or rain."—*J. M. Esq.*

In *Pembroke above the mountains*, our information is nearly the same. "Hay is generally left to wither in the swath for one day; it is then tedded or spread abroad as even as possible, and when sufficiently dry, gathered up into cocks, wherein it remains for two, three, or four days, then carried, the weather supposed to be fair; the process in foul weather, in this as well as other countries, is to *open and spread it again*, and who knows what afterwards? till it can be safely got into the stack."

The most general method of making hay, is spreading each morning the former day's math, *always* putting it into small cocks in the evening; the third day these cocks are carefully spread as soon as can be after the dew is up; about noon the hay is turned, and before sun-set is collected into middling sized cocks; the fourth day these are again spread, turned, and collected ready for carriage. Similar to this we found the practice in most places; in Radnor, Brecon, Vale of Towy, Hundred of Cydweli (*Kidwelly*), Cardigan, &c. In most of these places, it is a general maxim, that



that hay should not be left spread abroad for the night, and never is the case, unless the makers are surprised by a sudden shower, and have no alternative.

Some few, who study the cheapness of making more than the quality of the hay, only turn the swaths in a day or two after mowing—the swaths are then divided into small cocks—these, after remaining some time, are turned, then broken, and thrown into large cocks. This practice was communicated to us in the Vale of Usk. In precarious weather, hay, not sufficiently harvested, is put into large cocks of a waggon load or two each, which, if gathered immediately into a stack, might endanger the whole; then the first opportunity, and having the prospect of a fine day, the stack is made.—*Vales of Radnor, Glamorgan, &c.*

*Time in making.*—The West-walians, whether of the northern or southern department, have a striking similarity of manners, character, and customs; and among these we may instance their permitting *their hay to be overdone*. The East-walians sometimes run into the other extreme, and some of them have now and then occasion to be more busy in opening their stacks when overheated than they had been in putting them together. “Collect your hay green,” seems to be the motto of some farmers. A Miskin farmer said—“I would rather see my hay burnt, from too speedy making, than not in some danger of burning from hasty making in dry and warm weather.”

Dry and warm weather is the season of danger to hasty hay-makers; weather of an opposite description compels them to give the hay time to season. Careful farmers are very scrupulous in attending to the well-tedding and spreading of their hay, during the first

and second days, as they are the operations on which the success of making good hay chiefly depends; when these are well done, there is less danger of burning, than in other hay under equal circumstances as to succulency, time in making, &c.; but not so minutely tedded and spread: what they call "locks of hay,"\* seldom find their way into their stacks. The document that has given us the greatest satisfaction on this subject, is that published by *Practicus*, in the *Agricultural Magazine* for June, 1802, wherein is described the excellent method practised by the farmers in the neighbourhood of Cricklade, in the county of Wilts, and which we beg leave here to insert, for the satisfaction of such South Wales farmers whose practice is nearly similar, as well as for the instruction of those whose method of hay-making is very different.

"The land here, though a strong clay† to the very surface, produces an herbage very luxuriant, and at the same time fine, and plentifully intermixed with white clover. This herbage, when converted into hay, according to the excellent practice of this neighbourhood, is found to be equally fattening with the best hay and corn, or hay and oil-cake, of almost any other district in His Majesty's dominions. Indeed nothing but grass and hay are ever used here in the process of fattening, even the largest oxen. If the graziers in this part of Wiltshire should think it worth their while to exert themselves in pursuit of the premiums given by Lord Somerville, no other graziers in the kingdom could possibly contend with them.

"In the mode of *hay-making* here, they excel as

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\* "Cudynau neu durwan o wair."

† Clayey loam.—*Qu. W. D.*



much as in their herbage. I shall therefore relate a few particulars of their process, as given me by one of them.—“My chief consideration is (says he) *to make such hay as will fatten*, not merely keep cattle alive; and my least consideration is the expense of doing this. Before I begin, I always engage five good hay-makers to each mower. On the first morning of mowing, although there is apparently little for them to do, I order out my whole strength, and first, by a *careful tedding*, and, as soon as this is done, by an immediate turning of the grass, whilst it is in its grass state, this herbage is so worked, that scarcely any two blades of it can be found adhering to each other, or lying in the same direction. Thus the whole is made to lie as open or hollow as possible, and every blade is equally exposed to the drying effects of sun and air, and the colour and smell of the whole is, as much as possible, preserved. By having plenty of hands, I can give it repeated turnings, and I gain nearly a whole day in the process, by working it well at first; and thus, a few shillings extra expended at the beginning, is frequently the saving or gaining of pounds. *I never suffer my hay to lie abroad upon the ground after five o'clock* in the afternoon, when the falling of the evening's dew commences, which is, I am convinced, very injurious to hay. I never suffer my hay to be touched in the morning, till the dew has entirely disappeared. I never carry my hay together into a barn or building, but always into a rick, where, I know, it settles much closer together, and will keep much sweeter, and preserve its weight much longer than in a covered building.”

“These rules and regulations, although they may not be new to many, are, I assert, genuine and essential

tial to the process of making good hay; and the man who observes them not, is either ignorant of, or inattentive to his own interest. I wish particularly to set this method in competition with that recommended a year or two ago by Mr. Wakefield, near Liverpool, in an Essay to the Society of Arts, and for which, I am afraid, he received a premium from the Society; which was nothing more nor less than binding up green clover in bundles, and suffering them to remain standing on one end till they were ready to be carried together, or rather, till the outsides of the bundles were roasted, and their insides rotten. The true principle of hay-making surely is, to dry every particle of the hay alike, and never suffer fermentation to take place before the hay is collected in the rick. I call upon every practical husbandman in the kingdom to counteract these spurious doctrines. Let not the practice of the sloven, because it happens in one favourable season to be right, divert or lessen our esteem for rational, long-tried, and long-approved systems of husbandry."—*Practicus*.

The method of making hay in Middlesex, deserves the commendation given it by Mr. Middleton, in his Report thereof, (p. 237); but the method is not so peculiar to Middlesex as he supposes, as we have seen it practised in various parts of Wales, by careful farmers, ever since we remember, though not in a connected tract any thing equal to Middlesex. Our valleys, &c. are separated by ranges of mountains; and the method approved of and adopted in one vale, &c. may be very different from that practised in the next.

In the Middlesex Report, (p. 247), Dr. Walker attributes the heating of hay in the stack to "moisture received from the atmosphere," rather than to the "sap of the grass," when not sufficiently seasoned. Mr.

Middleton

Middleton and Mr. Baird are of a different opinion, and so are all practical farmers with whom we are acquainted. The general opinion is, as we have before stated, that hay stacked too soon, in very good weather, without receiving a drop of rain, or imbibing a pearl of dew that was not again evaporated, is in the greatest danger of burning from excessive heat; and that, on the contrary, hay put into the stack "dead and discoloured," and not dry to the feel, from the effect of atmospheric moisture, will become mouldy, and even half rotten, unwholesome for use, and consequently of little or no value.

In showery weather, when hay has been hastily put together in sizeable cocks, under an apprehension of approaching rain, and rain actually falls, next morning, if no immediate prospect of weather ensures spreading, it is a good practice to order the hay-makers to pull with their hands all around the bottoms of the cocks, in the same manner as wetted straw is pulled for thatching, and place the hay thus pulled, in gavels or gripes transversely across each other around the summits of the cocks: if the wind blows, it will dry; if it rains, the gavels thus pulled into a parallel direction of blades, and thus placed, will preserve both themselves and the unmoved bases, much better than when the blades of hay are in all confused directions.

*Hay-Stacks.*—"In the lime and stone tracts of the western counties, some farmers make their stacks on saddles of masonry. These are mostly round, from ten to fifteen or more feet over, and about two or two feet and a half high. In each saddle are formed air-flues or vents, from the four cardinal points, or, as some prefer it, from the points S. E. S. W. N. W. and N. E. :



N. E. : these all meet in the centre, in a circular opening about one foot diameter. At the commencement of stack-making, a bag filled with straw, a large sheaf of straw, or four boards nailed together, is laid perpendicularly upon the opening, and drawn up regularly, as the stack advances, to the very summit. The air entering at the flues, goes up through the funnel in the stack, cools the hay, as it is supposed; and by the same vents, the damp and heated air escapes out of the hay, which otherwise might engender fire, and burn the hay. The funnel is left uncovered at the top, till the heated air, which appears for some time like steam issuing out of it as from a chimney, ceases to rise and disappears; then the stack is thatched, to secure it from rain.

“ In the eastern counties, farmers frequently, in bad seasons, form such a perpendicular vent all the way up from the ground; but they doubt the utility of the horizontal flues: these, they say, operate as so many pair of bellows to blow up the heated hay into fire. They admit the utility of the upright vent, by which the steam escapes, but will not allow it to be proper or safe to admit the air in at the bottom.

“ That the admission of air rather causes than prevents fire, may appear from what we have not unfrequently observed in Glamorgan: when, by the quantity and heat of the steam issuing from the stack, the hay was supposed to be in danger, it has been opened, and though no fire had actually appeared in the stack, yet as soon as opened, and the hay spread out to cool, the air, to which it became now exposed, blew the hay so spread up into flames; and it was in the hay, after it had been so spread out, that the actual fire first appeared, and not in the stack.

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"The stack has, on such appearances of danger, been cut through, the section being about two and a half or three feet wide. The hay thus cut out and exposed to the air, has appeared very soon in flames, when no fire appeared in what remained uncut in the stack: this is generally done where no vent has been carried up in forming the stack.

"In dry weather, too little attention is paid to the seasoning of hay, which may dry rapidly to appearance, but from its great succulency, it will resolve in the stack, heat, and sometimes burn. On the richer soils of South Wales, hay is uncommonly succulent."

"Hay, moderately heated, is said to be best for horned cattle: not heated, is best for horses."—*E.W.*

*Summer Stacks.*—In the Vale of Glamorgan, when the hay is supposed to have withered sufficiently, it is made into large cocks of about half a ton each, and left there until a convenient time to be made into a stack, and that generally in the field where it grew, and where it is intended to be eaten on the spot by the stock in the following winter. Clover-hay is managed in the same manner.

This practice seems to be reprehensible, for three several reasons:

1. A good share of the whole crop, that is, the surface of every heap, will be partly bleached, and so deprived of its nutritious juices by sun, rain, &c.
2. It is frequently left so long before it be stacked, that the aftermath, especially of clover, is of good length before the stack is made, and consequently much of the second crop will be trampled in the carriage.
3. This feeding of the crop in the field whereon it grew,



grew, impoverishes the farm-yard of a great quantity of the best manure.

The foregoing reflections, just as they appeared at the time, drew forth the following animadversions from Mr. E. W.

“The *summer-stacks*, as the large cocks are called, never lie in the field above a week, not often above three or four days, unless uncommonly bad weather occurs, and in that case it is fortunate that the hay is in such a state. In very precarious weather, whatever may be summer-stacked is secure; when, if not so stacked, the whole would be exposed to the rain, and be much more damaged: besides, as the great business of working lime-kilns and fallows occur at the time, and hands are very deficient, it is necessary that the hay should wait a few days, in order to match at opportunities the operations of tillage.

“The stacks are never suffered to lie so long on the field as to injure the aftermath, unless in such weathers as would have occasioned the loss of the whole mown crop, had it not been so summer-stacked; and why suppose imaginary difficulties, and imaginary inconveniences?

“The surfaces are deprived of their nutritious juices”—not in any degree worth mentioning, if at all: in these summer-stacks they are rather retained. The hay in the vale is more succulent than in most parts of the country, and requires more time to be fit for winter-stacking than in other places, or it will be in danger of being burnt. It always heats, be the hay seemingly ever so dry in the summer-stacks; but in a few days, when the heat abates a little, it is carried and winter-stacked. This should be done before the heat has  
ceased

ceased altogether, else the hay will be the worse for it, as it should heat a little in the winter-stack. Hay on meagre soils may be ready for winter-stacking in a few days; but on soil of a superior quality, the hay is very succulent, and must have more time: hay abounding with ribwort, as that of Glamorgan Vale does, particularly requires this treatment, from its superior succulency.

"The farm-yard is impoverished."—But why not observe, in opposition to this objection, that the field is enriched? Ground mown and grazed alternately, *i. e.* hay one year, and grass the other, requires some kind of manuring; and if the hay is eaten on the field that produced it yearly, this alternation may be continued for ever; at least the Glamorganshire farmers unanimously assert it to be so. The expenses saved are many—1st, That of carrying the hay to the home stack-yard; then, that of manuring the field from the farm-yard: balance the whole. I will not venture to say that the popular practice is the best, but I will affirm, that the disadvantages of it are not as great as some who view only one side of the question imagine. The votaries of the new system are as strongly bigotted to their own theories as those of the old are, and their maxims are, in a number of instances, fallacious and unphilosophical. "It impoverishes the farm-yard." It does so indeed! but it does not, at least in the same degree, impoverish the *farm*. *Winter-foddering on the field*, is the only manure given in Glamorgan to hay or pasture grounds: it is not attended with the expense of bringing dung from the yard; it saves the time and expense of carrying the hay from the field, where, by means of a chain or rope, the summer-stack is dragged to the place where the winter-stack is made.

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The hay for foddering is on the spot, and saves time and labour; the mown field has its own crop returned into it in a state of manure, in the dung and urine of cattle, &c.

“These are the reasons for the practice, given by the farmer; the advantages of it consist in the savings of time, labour, carriage, &c., in harvesting, foddering, manuring, &c. The herbage of the field is said to be sweeter than if not foddered upon it: the cattle always winter as well as summer, night as well as day, in the open air, are supposed to be more hardy, healthy, and vigorous: the field is replenished with grass-seeds that shed from the hay: farm-yard dung fills pastures with weeds, from straw, &c., so that it is improper for either grass or corn, and chiefly used for turnips, which are hoed, and by that means weeds destroyed; or, to answer the same purpose, it is made into compost with lime; so that but for this practice of field-foddering, no manure would ever be laid on meadow and pasture ground. Whether these advantages compensate for the loss to the farm-yard, remains to be determined: let both sides of the question be duly considered.”

“In March, April, or May, when foddering abroad in the fields is over, the dung, mole-hills, &c. are beat and spread; straw and hay raked, and collected into the common heap; but if the field be lined in May, the raking and collecting of the hay, &c. is unnecessary. In March or April the stock are foddered on land to be fallowed or sward-dressed with lime, that the hay-grounds may be cleared in time. It seldom happens necessary to fodder before Christmas.”—*E. W.*

“All cattle are housed in winter in the hilly parts of Glamorgan, and oxen were housed in the Vale, about sixty years back; now they are mostly outliers. By  
foddering



foddering out, much manure is lost, and it is a great mistake to suppose their droppings in the fields to be of equal use to the land, or any thing like it. But it is said that cattle are more healthy by lying in the air. Formerly diseases were common, and among others, the bloody murrain: there is not, probably, a person now in the Vale that would know the murrain, were it to appear there. It is believed also, that housing of sheep, as practised in England, renders them unhealthy."—*E. Morgan, Esq.*

*Aftermath*, where it is rented separately, lets at various prices, according to quality and demand, from 15s. to 30s. an acre: near towns, within the reach of graziers and butchers, it lets higher: near Cowbridge it lets for two guineas per acre for the three months of September, October, and November.

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#### SECT. VI.—CULTIVATED OR SOWN GRASSES.

1. *Broad-leaved, or common red clover* (*trifolium pratense*), in Welsh, *march-veillion*.

Of cultivated grasses, this is not only the *first* introduced, but also the *first* in quality, profit, and general use.

"It is said to have been first introduced into Glamorgan by Sir Edward Stradling of St. Donats, Mr. Seyse of Boverton, and on the East Orchard estate, about 1680 or 1690. One Sharrock came to Boverton to manage it. John Sharrock, his great grandson, died at Lantwit about the year 1767, who gave me this account. Soon after, clover is said to have been introduced

duced into Gower, on the Stout-hall estate, by — Lucas, Esq. the proprietor\*.

“At first, the preparation for clover was a summer-fallow; it was sown alone in August, preserved from all stock till spring, when it produced luxuriant crops, and lasted in the ground three or four years, when it gave way to natural grasses.”—*E. W.*

That this clover is perennial, is asserted by Curtis, in his *Practical Observations on British Grasses*, p. 55, —“We see that lucern, when left to itself, is soon overpowered; if we sow *broad-leaved clover*, which is undoubtedly a perennial, the first year we shall have a great crop of clover; let this field be kept to itself, and the clover, like the lucern, will yearly diminish; not because it is a biennial, as some have supposed; but because plants hardier or more congenial to the soil, usurp its place.”—*Curtis.*

“Old men in Glamorgan were used to say, that by mowing clover twice every summer, it lasted in the soil three or four years; and by grazing it, it would continue five or six years. However, it is said that its hoving quality brought it into disrepute, and its culture was discontinued for some years. The recollection of its former productiveness procured it a second trial, and the sowing of it alone in autumn, continued till the year 1716, when the great frost of that winter destroyed it on Mr. Lucas’s farm at Stout-hall. Mr. Lucas was deemed one of the first agriculturists of his

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\* “About 1735, clover was introduced into the uplands of Glamorgan (*Blaenau*); it was generally sown on pared and burnt fallows, and the crops were prodigious for several years; it was never mown the first year. Having suspended the growing of it for a while, after many years, it was again brought into courses of tillage as an ameliorating crop.”—*E. Morgan, Esq.*



time: not willing to forego his clover crop for a whole year, he made an experiment to sow it with barley in the spring: it of course succeeded; his neighbours followed the example; and from that time to the present, clover is generally sown with spring crops, barley, oats, and sometimes with beans. About 1720 wheat came to be sown by a few on clover ley of two years standing; the clover being grazed the first year, and two crops of hay taken the second year."—*E. W.*

The Rev. Dr. Hunt of Margam, had clover and other grass-seeds sown on an autumn crop of wheat April 24, 1810; the seeds were buried by a light harrow without injuring the wheat. The field consisted of two kinds of soil, one peaty, the other clayey; the former produced a good crop of hay, the latter not so good, owing probably to a too indurated surface.

No grass-seeds were sown with clover till about 1740, when rye-grass (*lolium perenne*) was introduced into the system.

Clover was, from its first introduction, considered more as a connecting link between courses of corn crops, than as a lay-down crop at the conclusion of the course; it is so still in the Flemish course of turnips, barley, clover, wheat, as well as in the anomalous or popular courses of two, three, or more corn crops, and then clover. When clover is intended to continue but for one year, between barley and wheat, the sowing of it alone is preferred; to continue for two years or more, other seeds are added to it.

The quantity sown varies considerably in different parts, and even in the same parts, in the practice of different farmers.

"From 7 to 10lbs. of red clover, and two gallons of rye-grass seed per acre, when the land is sown to  
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be ploughed up again : when the ground is intended to remain in grass for some time, white-clover (*trifolium repens*) and rib-wort (*plantago lanceolata*) are substituted instead of red-clover and rye-grass."—*Vales of Radnor*.

"To continue one year only, 8lb. of red clover ; to lay two years, 10lb. of red clover, and two gallons of rye-grass seed, are sown per acre."—*Mr. Clark in Brecon*.

Even in the above counties, some farmers recommend the sowing of from 15 to 18 lb. per acre, and estimate 10lb. as the average.

From 12 to 16lb. per acre, may be the general average of Glamorganshire and the three western counties ; some few sow more, others less, according to the quality and state of the soil, and the farmer's private opinion on the subject.

"From 9 to 12lb. of clover seed, and a peck of rye-grass seed, is the usual quantity for an acre to remain in grass ; but double that quantity has been sown with advantage : from 20 to 24lb. is much better than less, be the soil ever so good."—*E. M. Esq. (Blaenau Morgantwg ; or, Glamorganshire Coal-tract)*.

The seed is commonly covered in by a light harrow, sometimes bushed with thorns. Light harrowing is expeditiously performed, especially in Glamorganshire : the horse saddled, and mounted by a boy, draws the harrow on a sharp trot. In doing this, though the pace of the horse may be regular, yet the operation of the harrow cannot well be expected to be so. The roller sometimes precedes, and sometimes follows the sowing of grass-seeds, according to the state of the soil. Sometimes grass-seeds are not sown till the blades of corn are up ; in this case, the roller supplies the place of the harrow.

*Preser-*

*Preservation of Seed.*—Formerly the first growth was preserved, to produce what is commonly called maiden-seed. For some time back, the first growth is commonly grazed till the latter end of May or beginning of June, and then shut up for seed. Rank crops on loamy soils are more profitable for hay than left for seed; for which a medium crop, on a somewhat sharp soil, is deemed the best, or most productive, and at the same time causing a lesser loss in fodder. Clover harvest is rendered more precarious owing to the late ripening of the second growth, and this is offered as a reason that not much clover is preserved for seed in the three western counties: some farmers say it never ripens well there. The moisture of the climature may be an obstacle; and if it be not, it would be advisable for the farmers in those counties to preserve the clover of the first or spring growth for maiden-seed, that it may ripen in season to be well harvested.

“*To obtain the best clover seed*, a small field of dry soil should be fallowed and manured for clover alone, and sown in September, or if convenient in August, that it may acquire strength to stand the winter. In April, or early in May, according to the crop, begin to depasture it with sheep, and so on till the end of October; but beware of bearing too hard upon it at one time; then shut up till mid-April, &c. and depasture it with sheep till June; then turn out, and preserve it well: when ripe mow the clover; and from an acre thus managed, as much seed in quantity, and much better in quality, will be obtained than from twice, or even thrice the quantity of land in the common way.”—*A Gower Farmer.*

The western counties are disadvantageously circumstanced also, as to their apparatus for *shelling* clover:



common millstones, wider set than ordinary, is the only contrivance with which we are acquainted.

In some parts of the eastern counties, when the clover-shelling season commences, in February or early in March, the upper millstone is removed, and a square block of oak with eight spokes or wings, as represented below, is fixed in its place :



*a*, the square block of oak, elm, or crab-tree.

*bb*, the four nether spokes, dove-tailed into each other, and gadded to the base of the block, just so as to revolve clear of the lower millstone : these spokes are studded with stubs of eightpenny or tenpenny nails, on their *upper* surfaces.

*c*, the four upper spokes, morticed into the sides of the block, about six or eight inches above the nether spokes : these are studded with nails on their *under* surfaces.

The dotted circle is the rim surrounding the machinery ; it is about two feet, or thirty inches deep, and from five to six feet diameter, being always of wider dimensions than the rim used for common grinding.

The

The miller's man attends to feed the machine with the clover *pouce*, and the spokes, by their rapid motion, soon beat out the seed, which, mixed with dust, passes through a tin strainer fixed over the pipe of the mill; in their passage from the pipe, the seed and dust are separated by agitated sieves, fanners, &c. worked by the motion of the mill. When the machinery becomes clogged with the coarser refuse, the tin strainer is removed, and the whole is ejected through the open pipe; this thrown aside, the machine is again replenished with fresh *pouce*, and so on, &c.

The miller's charge is from 2s. to 2s. 6d. per measure of 40 quarts; and in some places, with liberal allowance of victuals and beer to the feeder of the machine.

Though varieties occur in this kind of machinery, yet the principle is the same; in some, the nave or stock is cylindrical, like that of a common cart wheel, with three sets of spokes or beaters, four in each, at regular distances, placed diagonally, not vertically, above each other, and studded with nails all around. The inside of the rim is also studded. Some have narrow fanners of coarse canvas nailed to the four upper spokes, to collect air, and to cause the dust to ascend more freely from the seed. Of course three sets of spokes require a deeper rim than the dimensions given above for two sets.

In towns, grocers and others deal in clover and other seeds, who procure them from London, Bristol, Liverpool, &c., as the quantity raised in the country is not nearly sufficient to satisfy the demand. The few who raise clover-seed, dispose of what they have to spare to their neighbours, attend the neighbouring



markets with it, or sell it wholesale to the seedsmen. Home seed is more eagerly sought after by country farmers than the foreign seed of the shops, which is entirely owing to prejudice; for it has been proved, that plump foreign seed produces pasture to be turned into about a fortnight earlier than home seed, which is a matter of great consequence, when and where fodder is scarce in the spring.

That "*land is become tired of clover*," is rather a common complaint in several parts of the eastern counties; that where it formerly lasted two or three years, it now not uncommonly disappears the first year.

The matter of fact, as to its disappearance, is certain; but the cause of its failure, viz. that "*the land gets tired of it*," admits of a doubt.

That clover should ever have continued in the ground above two years, in the humid climature of South Wales, is rather to be wondered at; not that clover is a biennial, nor that a humid climature disagrees with it, but that it encourages the vigorous and incessant growth of other more hardy grasses—grasses which, like the Ancient Britons of old, will not tamely give up their native soil to foreigners without repeated struggles for independence. Clover, the most valuable of all introduced grasses, is however better calculated to cope with the natives than any other foreign species, as it is of so vigorous a growth, and attains its perfection the first year, which is not the case with sainfoin, lucern, &c. which are not uncommonly smothered before they attain any size, notwithstanding clean fallowing, and even hoeing.

It appears that clover began to fail where its cultivation first took place: this probably gave rise to the  
suppo-

supposition that "the soil had grown tired of it." But the failure commonly takes place in a soil favourable to the lodgement of several tribes of insects, which feed upon the roots of the broad red clover in preference to those of any other plant. The frequent recurrence of clover in the rotations of crops, such as clover, wheat, barley, clover again, &c. caused the failure it is true,—not that "clover tired the land," but that it increased the number of insects, by affording them more choice and superior food. It has been observed, that the root of the red clover is not so bitter to the human taste as that of other cultivated grasses: whether it is so or not, or whether there be any analogy between the human and insect taste, is immaterial; the fact of the disappearing of clover the first year is obvious, and the cause of it can be more rationally attributed to insects, than to "the land growing tired of it," which savours too much of the exploded Woodwardian philosophy. The Doctor held (*Philosophical Transactions*, No. 253), that "each sort of grain takes forth from the soil that peculiar matter that is proper for its own nourishment, &c." Were this true, it would be high time, as of late, to strew powdered gypsum like snuff over land tired of clover, to replenish its exhausted food; but Tull, a greater agricultural philosopher than Woodward, very justly asserts (p. 110), that "every kind of vegetable growing in the same soil, takes and is nourished by the same sort of food; and it follows from hence, that the beneficial change of sorts of seeds or plants we see in the common husbandry, is not from the quality of the sorts of food, but from other causes, such as; 1. The quantity of food; 2. *The constitution of the plants*; 3. The quantity of the tillage."



The constitution of clover may therefore be presumed to be the cause of its failure; 1. In producing a root so palatable to the taste of its destroyers; 2. In being not hardy enough to maintain its situation against natural grasses. The *pupæ* of the cock-chaffer beetle, the May-bug or Doree beetle, commit great ravages occasionally on the roots of clover in the Vale of Usk, and on the white limestone soils in the Vale of Glamorgan; the soil being light, and favourable to their preservation and progress to their winged state; and when that metamorphosis takes place, the same state of soil entices the deposition of succeeding colonies.

Skim or shallow ploughing of leys infested with insects, has been recommended, so as to expose them more effectually to small birds, rooks, and frost: this shallow ploughing to be followed by an immediate harrowing, liming, &c., and finally by ploughing to the usual depth.

In Cardiganshire, and parts of the other western counties, the failure of clover the first or second year is not so much complained of: it was later introduced, and is less frequently sown there, it is true, and that favours the idea that the soil is not yet "grown tired of clover\*." These very reasons account for the under-ground insects being less numerous, if known at all there. Some farmers in the eastern counties, have delved the patches of missed clover in quest of the suspected thieves; but if they were the *larvæ* of some winged insects, they may have done the mischief and taken the wing before the *hue and cry* was made.

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\* Even in Cardiganshire, clover is said to produce "three annual crops where it never grew before, and only one where it has been cultivated for numerous courses."—*Vale of Teivy*.

This failure of red clover has caused in several places the introduction of white clover in its stead. On inferior soils it is rather an inferior substitute, when designed as an intermediate link in the rotation; though in richer soils, and in laying down for pasture, it is a very valuable grass. On inferior soils, the introduction of white clover alternately with the red, in the rotation, might be preferable to the discarding of the red altogether; for by this alternation of white and red clover, the devouring insects would not be so frequently fed with their favourite repast; a period of starvation would intervene between the two crops of red clover in the same soil.

The varieties of red clover (*trifolium pratense*), which grow naturally in meadows, pastures, &c. are,

1. *The meadow or cow-clover*, or honey-suckle trefoil (*meillon cochion*), the seed of which is professed to be sold under the name of cow-grass\*: it abounds in gravelly loams, and even in inferior soils, where it never before appeared, after being top-dressed with composts, ashes, &c. Its flowers ripen exceedingly early, and are commonly lost in hay crops, by waiting for the ripening of most grasses, excepting the sweet-scented vernal-grass (*anthoxanthum odoratum*), and the meadow foxtail (*alopecurus pratensis*).

2. *Long-leaved perennial clover* (marl-grass of Hudson, *trifolium flexuosum*), recommended to be cultivated in clayey soils, with common clover and rye-grass: "but having a disposition naturally to propagate

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\* Land is laid down in cow-grass in several parts of the district. We saw seven acres of it in hay in the Vale of Teivy: the proprietor was preserving seed to supply his neighbours: the price about equal to that of broad clover.

itself by running in the root, I am afraid its seed will not ripen in sufficient quantity for any considerable scale of cultivation: the attempt of raising its seed is however well worth making."—*Original Report of Stafford*, p. 27.

This trefoil is undoubtedly very hardy; it is found flourishing where it has scarcely any soil to support itself; in upland situations, and occasionally on cold rosy land, the soil a hungry clay, producing few plants excepting carexes. Curtis, in his "Practical Observations on British Grasses," recommends the cultivation of the tall fescue-grass (*festuca elatior*), the darnel fescue-grass (*festuca loliacea*), the smooth-stalked meadow-grass (*poa pratensis*), &c. "by parting their roots, and planting them out." In his observation on the tall fescue-grass, whose seeds are not fertile, he proceeds (p. 24)—"In this there would be no great difficulty, provided it were likely to answer the expense, which we are strongly of opinion it would in certain cases; indeed we have often thought that meadows would be best formed by planting out the roots of grasses, and other plants, in a regular manner; and, however singular such a practice may appear at present, it will probably be adopted at some future period: this great advantage would attend it, noxious weeds might more easily be kept down, until the grasses and other plants had established themselves."

This prophecy of Curtis has been exactly fulfilled in Dr. Richardson, and his much celebrated and much contested "*florin-grass*."

We were led into this digression on "parting and planting out the roots of plants," owing to the supposed difficulty of raising the "long-leaved perennial clover"



clover" from seed. Many other valuable plants, &c. worthy of cultivation may be in the same predicament. We made repeated trials to raise the tufted vetch (*vicia cracca*) from seed, and failed completely in all of them.

2. *White, or Dutch clover* (*trifolium repens*), in Welsh, *meillion gwynion*—though abounding in all dry and sweet pastures, &c. was not brought into cultivation, according to Mr. E. W. till about 1750; and not upon any extensive scale, until the failure of red clover began to be complained of. On inferior soils the crop is not nearly so luxuriant as that of red clover when it succeeds; but its great recommendation is its certainty. "I prefer white clover, as it succeeds extremely well: land often gets tired of red clover, but not of the white, which yields a better, and more certain crop." This is a common opinion from the Vales of Radnor to the British Channel; and to this may be added, that "it bears grazing with sheep in the spring better than the red."

It is pretty general over the whole district, to lay down for pasture in white clover, and a mixture of other seeds; but the practice of sowing white clover alone, as a middle link in the rotation, between two corn crops, is adopted only by a few, though the practice gains ground: common farmers, in general, still run the risk of red clover, with rye-grass, when sown between two white crops.

In fertile soils, the white clover grows very luxuriantly. Near Aberlunvey, in the Vale of Wye, we saw a part of a field preserved for seed, the stems measuring from 16 to 20 inches, and the other part,  
hurdled

hurdled out for pasture, was continually springing up, in spite of a numerous stock.

Common farmers do not sow above from 8 to 10lb. of white clover per acre; several do not sow above 6lb. to an acre; and one farmer boasted his having obtained a crop worth the preserving for seed from 3lb. an acre. Others, in the Vales of Wye, Usk, Glamorgan, Teivy, &c. agree in opinion, that from 12 to 13lb. is the most profitable quantity, upon a well prepared soil. Some add from half a bushel to a bushel of rye-grass seed to 12lb. of white clover seed per acre; others think two gallons of rye-grass seed sufficient, even with from 8 to 10lb. of red clover.

A gentleman in the Vale of Usk, sold forty pound's worth of white clover seed from three acres.

A gentleman in the Vale of Teivy, preserved a piece of natural pasture, producing scarcely any thing besides white clover for seed; and succeeding, repeated the practice frequently, and was used to sell it to a great amount, at 1s. 6d. per pound.

"A white clover brush is an excellent preparation for wheat."—*Mr. Mathews, Mr. Marmont, &c.*

### 3. *Rye, or Ray-grass (lolium perenne).*

Until within these few years, no seeds of meadow or pasture grasses, taking the term in its strict sense, were to be had on sale, even in England, excepting rye-grass (*lolium perenne*), Yorkshire grass (*holcus lanatus*), and Suffolk grass (*poa annua*). The former of these only found its way into Wales, as a cultivated grass, about the year 1740.

"Why indeed the *lolium perenne* (rye-grass) should originally have been made use of, in preference to all  
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the other grasses, cannot, perhaps, be satisfactorily accounted for; most probably it owes its introduction to accident, or to its being a common grass whose seeds were easily collected, rather than to its being preferred from any investigation of its merits compared with the others: however this may be, there appears to be no reason for excluding the others—for it would appear exceedingly improbable that, of upwards of one hundred grasses\* growing wild in this country, the Author of Nature should have created one only as suitable to be cultivated for pasturage or fodder."—*Curtis*, p. 4†.

Rye-grass is still very generally sown by most farmers, excepting by a few of the New School, who discard it entirely, or by the few poor farmers who seldom sow any grass-seeds at all. It is even sown separately, and that by some on the best soils of the Vale of Glamorgan, who consider it as no discredit, as "it affords early grass in the spring." Most who grow it, preserve some seed in favourable seasons; others make it a profitable crop, by saving the whole seed, and selling it at various prices, according to the demand, plenty or scarcity of clover-seed, &c. from 3s. to 6s. per measure of 40 quarts. In Pembrokeshire, and some other parts of the western counties, the crop of rye-grass is bound in sheaves, and shocked like corn to season on the field, then carried in and thrashed. Its hay, deprived of seed, grown full ripe, or damaged by rain, affords much worse fodder than good oat-straw. It is sown with white as well as with red clover: with the latter it seems the more necessary, so as

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\* "The word *grasses* is here understood in its strict sense."

† See this subject continued in the Section on *Laying down Land in Grass*.



to fill up the blanks with some verdure better than that of weeds, in case of the clover failing.

“He that sees his rye-grass coming up too thick for the clover, should graze both in the spring; then the clover will be the most abundant of the two for hay, or for a second grazing; if both be preserved from the spring for hay, rye-grass, once predominant, will considerably check the clover.”

“Rye-grass affords an early bit, which is its greatest recommendation: by August it is at a stop; then if autumnal rains fall, it will give a second spring: it should be constantly fed down, so as not to run into dry husky stalks. The choicest seed is the smallest in size, and most ponderous in proportion to the quantity; the chaffy large seed produces a coarser variety.”—*Rev. Mr. Powell.*

When rye-grass is sown alone, it should be sown thick, so that multiplicity of blades may render each other finer: some in the coal tract of Glamorganshire, &c. sow it as thick as oats, *i. e.* about five bushels per acre; this, at 4*s.* a bushel, the average price in some places, makes it more expensive than laying down either in red or white clover; but probably the seed thus sown is of a very inferior sort, and consequently of little value.

The best application of rye-grass is to cold clayey soils, where few of our present cultivated trefoils would succeed. On such land lying flat, and retaining water in winter, collected into round ridges, clover is sown on the crown of each ridge, and rye-grass on the more clayey and wet hollows between the ridges. The field so managed, bears a full crop; and when the clover stripes are in blossom, it adds a checkered variety to the scenery of a wild country.

Some

Some who are in the habit of preserving ray-grass and other hay-loft seeds, without the means of boarding the lofts well, get mats of rye or wheat straw made in the lofts to fit them.

4. *Yellow, or Hop clover* (*trifolium agrarium—lupulina*).

*Trefoil*, as it is commonly called by farmers, is far less common as a natural grass, and much less frequently cultivated, than the red and white clovers; it is said to have been first introduced into the list of the Glamorgan cultivated grasses about 1760; it is generally accompanied by a portion of ray-grass seed, which is considered (perhaps too highly) as a guardian-general of the trefoil, or clover tribe in the spring, in case of weather unfavourable to their growth; but in this case, as in some others, the guardian does not always deal fair with its ward.

Compared with the red and white clovers, trefoil is commonly held in low estimation: when mown for hay in July, and even in June, it produces no after-math; and when grazed like ray-grass, it is at a stop about August. Its chief recommendations are, that "*land does not get tired of it*," like red clover; *i. e.* its roots afford little or no temptation to the subterranean foes of red clover; and dairy-women hold it in esteem, on upland farms where natural pastures are scanty, though the plant naturally affects, and prospers most in strong vale lands (*doldir*).

When red clover sells from 10*d.* to 14*d.* per pound, and white clover from 14*d.* to 16*d.*, trefoil generally is to be had from 6*d.* to 8*d.*; but as it requires double quantity to the acre, there is nothing saved by the substi-



substitution. Trefoil generally supplies a portion of seed in laying down a piece for *cow-pasture*.

"Trefoil is a better crop preparatory for wheat than the broad clover; better wheat after it."—*A Gower Farmer*.

These four are, by far, the most commonly cultivated grasses of the district.

5. *Sainfoin* (*hedysarum onobrychis*) "was introduced into Glamorgan, under the name of French grass, about 1760, by Mr. Nichols, of Ham; and soon after by Mr. Jones, of Fon Mon; Mr. Harvey, of St. Donat's; Mr. Willis, of Gileston; Mr. Jones, of Boverton, &c."—*E. W.*

Sainfoin is still grown upon a pretty large scale on the limestone soils of the Vale of Glamorgan; but the crops (in general) seem inferior to those on the chalky and limestone brash soils England.

"In 1804, I travelled through the chalky counties of Berks, Hants, Wilts, &c. and saw great numbers of fields under sainfoin; but none superior to what I have seen on limestone in Glamorgan, and many that were inferior."—*E. W.*

"Graze sainfoin till May with sheep, and it will afterwards give two tons per acre of hay."—*Mr. Mathews*.

"Common practice confines the culture of sainfoin to the chalky and limestone countries; but we are of opinion, that it would succeed well in deep soils, provided they are not too strong: that it will not succeed on good deep soils is fallacious; it will not be so early, it is true, but afterwards excellent."—*Messrs. Vancouver and Sweet*.

"Calcareous soils are particularly favourable to  
sainfoin;

sainfoin ; the chalk soils of Wilts, limestone soils of Glamorgan, &c. ; but upon all other soils, of whatever character they may be, the crops of sainfoin are inferior : the limestone soils, along the sea cliffs in Glamorgan, (including Gower) are often not more than four inches deep, on a rock of limestone of very open fissures ; but we find very heavy crops of sainfoin upon them ; and especially from Barry to Pyle. In Cardiganshire, and in other counties, as well as in Glamorgan, on soils seemingly more fertile, eight or ten inches deep, on a healthy gravelly bottom, on a dry slate rock, on an equally dry sandstone, freestone, millstone, micaceous schist, &c. I have seen crops of sainfoin that could not be compared to those on a very thin limestone rock soil, where very little of any thing could be expected : a sufficient proof that sainfoin delights, as it were, in a calcareous soil above all others."—*E. W.*

Even were Messrs. Vancouver and Sweet's supposition correct—that sainfoin would succeed well on sound deep soils ; yet, the advantage of it there would be far inferior to what it is on calcareous soils, so shallow that scarcely a crop of any other grass can be expected.

Several have not succeeded in the cultivation of sainfoin, owing either to the soil running too soon into natural grass, or the land being too full of weeds when the seed was sown. Mr. Gale, when he entered on Boverton farm, in the Vale of Glamorgan, sowed 80 acres with sainfoin : the soil (he said) was well adapted for it ; but it was in too foul a state ; he was consequently disappointed : he was induced to sow so much with sainfoin, owing to his " meadows consisting of too shallow soil to be productive in common hay." Others have succeeded better, on soils not over driven by tillage. At Tythegston, we saw excellent sainfoin in its

ninth year, and lucern in its tenth. Mr. Marmont of Pyle, had scores of acres in sainfoin. Many others had from four to ten acres each. Sea air is supposed to be favourable to sainfoin.

A plant, called by the Welsh "*Gwyg bendigaid*," is a wild sainfoin, growing naturally on the uplands adjoining the Vale of Teivy; in some of the mountain valleys of Brecon and Glamorgan, and in the Valley of the Elain, near Nant Wylt, in Radnorshire.

6. "*Lucern (medicago sativa)* was introduced into the Vale of Glamorgan by Mr. Winnall of Ely, about the year 1767. Many others took it up, and for some time became *lucern-mad*, as Mr. Key, the Diogenes of the day, expressed himself. Its cultivation has since declined, excepting in small quantities, for soiling horses chiefly, because it was found very difficult to keep down the natural grass, which smothered it, and rendered the labour abortive."—*E. W.*

"*Lucern* is more difficult of cultivation in France than Italy, and still more so in England than France. In Switzerland they grow *medica* for their cattle, or rather horses when sick, since they cannot by their culture raise quantities of it sufficient for their constant food: there being too much rain, and too little of the sun's violent heat, to prevent the speedy increase of grass among it. How then can we expect the success of sowing it in England, where rains are yet more frequent and the sun weaker? It is not one year in ten that the natural grass is here scorched up. In our rich land, the grass comes to a turf very soon; and the poor land will not, by the common sowing, bring lucern to perfection, though no grass should annoy it. By what intelligence I could get, all the land in this island

island is too rich, too poor, or too cold, for the *lucern* improvement, by the common husbandry; but never known to fail in the hoeing husbandry, well conducted.”  
—*Tull*, 22-95.

“ This is most certain, that unless we can keep our *lucern* pretty clean from natural grass, we cannot expect it to succeed, let the soil be ever so proper.”—*Ibid.* 102.

“ *Lucern*, whether drilled or broad-cast, will be always overpowered by the natural grass, so will sainfoin, &c. &c. in this western and humid climature, notwithstanding every possible endeavour to obviate this inconvenience. I have found it to be so repeatedly, and my landlord found it so before me; who, in spite of his strong partiality to the New System, found himself, in a variety of instances, under the necessity of deviating from it. We have had *lucern* sown in drills three or three feet and a half apart, in deep sound loams, and having room for the ploughs and hoes to work between; by which means, by frequent plough-hoings, it was kept clean; the crop was valuable, and continued so for several years; but notwithstanding the goodness of the crop, the continual expense of time and labour, as well as of ground by drills so widely asunder; it is questioned whether, instead of profit, a loss was not sustained. Our soils are very productive of grass, thence unfavourable to *lucern*; and sainfoin will not succeed but in drills, with annual and repeated horse-hoings; thence not more profitable than natural grass, and in general less so, after deducting all expenses: for these reasons, a judicious alternation of tillage (sufficiently manured, with three, or never exceeding four corn crops, with one at least of

clover) and of pasturage for as many years as those of tillage, is by many considered as more profitable."—*A Vale of Teivy Farmer.*

Lucern has been cultivated some years back in Caermarthenshire, on Taliaris demesne; and has of late been introduced into the neighbourhood of Llanelly and Pen-bre, by Mr. Hyett, and others.

7. "*Burnet*—was introduced into the Vale of Glamorgan by Mr. Jones, of Fon Mon, on his farm at Fontugary, about 1763."

There appears to be (at least) two kinds of burnet. Linnæus, in conformity with his sexual system, places one burnet in class *Tetrandria*, Order *Monogynia*; and the other in class *Monoccia*, Order *Polyandria*. Martin, in his edition of Miller, laments that two plants of so near resemblance should be so far separated.

The Editors of Dr. Rees's New Cyclopædia, having treated of *burnet* in agriculture, refer their readers for *burnet* in botany to *poterium* and *sanguisorba*; as if the one had been totally distinct from the other. Their inquisitive readers, however, who are no botanists, would have been more gratified, had they been informed, that *burnet in agriculture* was the *poterium of botanists*.

1. The great wild burnet (*sanguisorba officinalis*) is described as having a "stem three feet high, round, striated, smooth, hollow. Leaves pinnated, smooth, glossy, alternate. Spike short, oval, brown. June, July; in meadows and pastures frequent."

2. Burnet (*poterium sanguisorba*)—"Stem angular, a foot high, brown. Leaves pinnated, pinnæ about



about ten pair, with an odd one, serrated; middle rib hairy. Flowers purplish, on small spikes. July; on *chalk hills*."

The latter burnet is much more frequently to be found growing naturally than the former: and though it be recommended by M. De la Roque, and others, to be cultivated on dry light soils; and though it be more common growing wild, on chalk and limestone; yet there is scarcely a variety of soil where it does not occasionally appear. We have observed it in the following very different situations:

1. Growing in the crevices of limestone rocks, with scarcely any soil;—near St. Bride's Major in Glamorganshire, &c.

2. On the sands near Penarth Castle, and elsewhere in Gower; on Castleton sands, near the mouth of the Omore; on the sandy downs of Castle Martin in Pembrokeshire, mixed with abundance of yarrow.

3. On dry limestone soils, near Merthyr Tudful, and numerous other places.

4. On strong loams in the pastures of Tythegston: about Lallaston, on the grey lias limestone, soil a clayey loam, but somewhat calcareous, effervescing slightly with acids, burnet, cow-grass, ribwort, &c. grow spontaneously: observed a field sown with varieties of wheat; the plough and lime had destroyed all the natural grasses excepting the burnet, which was so thick in the wheat-stubble, that a stranger might have thought it had been sown with the wheat.

5. On sound loams in the mountain valleys of the coal and slate tracts; growing more luxuriant than in the ebb soils upon chalk and limestone: hence some have considered it as a distinct variety.

6. In places where it is least to be expected, on cold

and wet upland pastures, and rosy meadows, the soil apparently weepy and hungry. On the 9th of March, 1813, we went to view a spot of this description, annually producing more burnet than any other grass, and found only one plant, as the piece had been open to all species of stock during the winter. A furrow had been run through the piece, to carry off superfluous water. This furrow discovered the species of wet soil which burnet affected. The furrow, as far as clay with a mixture of peat extended, was full of burnet roots; but not a root was to be seen in the clay one inch beyond the boundary of the peaty mixture. May 12th, 1813, this spot was covered with burnet.

*Burnet*, by the confession of its warmest advocates, is not agreeable to the palate of cattle, or any other species of stock; this is evident from its remaining untouched during summer in open grounds, where every other grass is nibbled to the root; but use, they say, will accustom animals to its cucumber flavour; and especially by being fed with it early in the spring, when no other grass is to be had. Its excellence, and perhaps its only excellence, consists in its earliness, and in enduring the severities of winter, when not mowed late, or made bare in autumn, or trampled in winter, until the following spring, when green fodder is scarce, turnips gone, and clover, &c. not come. Its culture has been put to the test in several parts of this district; and, notwithstanding its presumed excellence in different soils and climates, the general opinion, here, is not in its favour.

“ I had an abundant crop of burnet; but after the two first days, neither cows, horses, nor sheep, would eat it; for that reason, instead of profit, a loss was sustained.”—*Vale of Teivy*.

Above

Above, the time of turning in the stock is not ascertained: if it was later than the beginning of May, the burnet may have grown too old. Its advocates say, that its grazing season is from the beginning of February to the latter end of April: shut up at that time, it will give a crop of hay of a ton per acre about Midsummer, or a crop for seed in July. In summer, when natural grasses are plenty, no stock have an appetite for it.

“Whatever may be the profits of some kinds of artificial grasses on dry farms of perpetual tillage, where there is very little of natural grass, and where it may be to cows, &c. *burnet*, *chicory*, or *nothing*, the case is very different in the mixed husbandry of Wales.”—*E. W.*

8. “*Chicory* has been tried, but without success: it is generally smothered by the natural grass. Sown broad-cast it came to nothing, though in a soil naturally good, and properly prepared for it. In drills, it probably would have succeeded; but the waste of ground in the three-feet drills, with the frequency of labour of the plough, are such, that, however luxuriant the crop may be, it covers no more than a small part of the soil: natural grass covers the whole; is attended with no labour of cleaning; answers every purpose of herbage, whether in hay or pasture; which *chicory* does not. Where *chicory* grows naturally, it may be valuable among other grasses: by itself, cattle, at least the Welsh cattle, will scarcely eat it; and the milk of cows fed on it alone, is inferior in quality, without being greater in quantity, to that from natural grass. For such reasons as these, *D. S.* has given it up, as well as *lucern* and *sainfoin*; all which he has tried

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without any ultimate success: and he commenced his agricultural career strongly prepossessed in favour of artificial grasses and every thing in the new system; and as strongly prejudiced against every maxim that stood in opposition to it."—*E. W.*

SECT. VII.—LAYING DOWN ARABLE LAND TO GRASS.

OUT of compliment to the increasing modern practice, we are inclined to invert the order of precedency, and to treat, *first*, of laying down land to grass *with seeds*; and then *secondly*, of the comparatively ancient practice, though still retained in particular parts of the district—laying down land *without grass-seeds*.

1. *With grass-seeds.* This is divisible into two modes: *the one*, done with judgment, and attended with profit; and *the other*, with inattention, which ends in loss and disappointment; in the *former*, the land, *not* exhausted by unconscionable courses of tillage, is laid down in "good heart," and the soil is well prepared to receive *choice* seeds, well adapted to its texture and quality; in the *latter*, when land is considered as not able to produce *one* corn crop more, or, more strictly speaking, *not half* a crop to encounter the better half of weeds, the poor farmer thinks it *high* time—he cannot think it *proper* time—to sow *some kind* of grass-seeds with the last white crop. Fortunately, however, this latter mode is getting less and less frequent: the examples of others, whose land, naturally of the same quality with their own, produces, by superior management, double, if not triple, their own crops, both of corn and grass, open by degrees the negligent

negligent farmers' eyes, to see their own interest, in adopting practices more profitable than that which they had adhered to from their infancy.

"The arable land of this county (*Radnor*), when discontinued to be ploughed, although not sown with seeds, is soon covered with grass, and in that state is called *bastard sward*. In the present state of agriculture, such is seldom or never permitted, and the land which the occupier wishes to convert into pasture, is regularly laid down with grass-seeds. These grasses are for the most part broad clover and ray-grass, when the land is soon to be ploughed up again; and white clover and cock-grass\* (ribwort, the *plantago lanceolata*), when it is intended to remain in grass for some time."—*T. Fr. Lewis, Esq.*

John Prichard, Esq. of Dol y Velin, in the parish of Heyop in this county, took this farm under his own management nearly forty years ago: it had been greatly exhausted by long repeated corn crops; the fields in rotation be tilled, manured, and laid down in "good heart," with white clover and ribwort; grasses natural

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\* From an high and very respectable authority we are recommended to sow *cocksfoot* seed with clover, instead of ray-grass. the term is not sufficiently distinct without the botanic name. Farmers, on applying to seedsmen for it, have been supplied with *cock-grass* seed (*plantago lanceolata*), which is already pretty commonly cultivated, with white clover, ray-grass, &c. If by the recommended *cocksfoot*-grass is meant the *dactylis glomerata*, without seeing successful experiments, we would hesitate sowing it with clover; because we consider it as too powerful a rival for the clover. "It is a rough, coarse grass, but extremely hardy and productive, common in orchards and meadows, and rather early." If it does not rob clover too much of its food in the soil, for a year or two, between corn crops, it would add greatly to the produce of hay; but if continued longer, without a mixture of other grasses, would it alone form *bateable* hay or pasture? In laying down a meadow upon a moist loam, we would recommend it, among other appropriate hay-seeds, merely on account of its great bulk.



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to the country\*, and consequently permanent. He considers ray-grass as scarcely superior to couch-grass, and fit only for the temporary crop of a shortly-suspended rotation of tillage crops. His farm is all under grass, the profitable permanency of which is supported by irrigation where it is practicable, and by top-dressing with composts of all proper materials within his reach, and especially a mixture of lime and peat soil, where watering is not convenient.

Some farmers make little distinction between the seeds sown as a middle link in a course of corn crops, and those sown at the conclusion of a course, when the land is to remain for some time in pasture: others, and by far the greater number, sow white clover and ribwort instead of broad clover and ray-grass; and many sow varieties of mixtures, which suit best the nature of the soil or their own opinion: these mixtures consist of the three clovers, red, white, and hop, with ribwort, ray-grass, &c.

“A mixture of red, white, and hop-clover, with a portion of ribwort, 18 lb. per acre.

“White clover and ribwort, 18 lb. per acre, and commonly laid down.

“Clover and ray-grass for uplands; clover and ribwort for lowlands.

“Ribwort, owing to its strong root, is not approved of, when the land is shortly to be ploughed again.”

In sowing mixtures, the finer seeds are sown by one person, and the coarser sorts by another following: but some farmers, to save time, mix the proportionate quantities of clover, ray-grass, &c. and sow both, or

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\* “If we force a plant on a soil or situation foreign to that in which it is constantly found, we deceive ourselves.”—*Curtis*.

all together, without any apparent difference in the succeeding crops.

Of late, in *laying down for meadow*, grass-seeds, properly so called, have been introduced; and probably owing to the recommendations of Curtis, and other writers on the subject. Those who introduce them, however, should attend to the observations of Curtis, &c. on particular grasses, and not sow them on soils, and in situations, different from those in which they are naturally found; otherwise they cannot well be expected to be perennial; they must give way, in time, to the natural offspring. The prices of these seeds, from London or elsewhere, are very high, though possibly they cannot be afforded for less by the distant seedsmen. Country gentlemen, therefore, would do well to appoint persons to see the choicest seeds collected at their proper seasons in their own neighbourhood, by poor women and children who draw from the parochial rates, and are not fully employed. We intend pursuing this subject further in Chap. XV. "*On the Poor.*"

In 1811, we saw packets of London seeds to be sown on poor wet soil, in the cold uplands of the coal tract, and charged as followeth: Dog's-tail grass, 3s. 6d.; Timothy, or cat's-tail, 2s.; ribwort 2d. per pound weight, and imperial ray-grass 3s.; meadow-foxtail 6s. 3d., and meadow-fescue 6s. 3d. per peck measure.

All these seeds, excepting perhaps the variety of ray-grass, may be collected in the country much cheaper, and probably better. The assortment above was not appropriate to the soil, especially the dog's-tail and foxtail seeds; and for hay, some of the grasses are of sorts that do not ripen within several weeks of each other. In natural meadows this inconvenience cannot  
be

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be avoided ; but in laid-down hay grounds, after a course of tillage, it becomes a matter of consideration that ought to be attended to. New pastures are much less difficultly formed than new meadows : for the latter, such grasses should be selected as not only suit the soil, but also spring, flower, and ripen nearly at the same time : in the former, mixtures that spring at various seasons, may be considered as no inconvenience, but rather an advantage. Upon this subject we refer our readers to the best writers on the subject, and more particularly to their own observation, when they become acquainted with the proper names of the grasses.

During our excursions, we had several inquiries about the seeds best calculated to form *lawns*, *grass-plats*, &c. : for the information of such inquirers, we beg leave to recommend the following, on the authority of a writer of science and experience\*.

1. "*Poa pratensis* (smooth-stalked meadow-grass), gives a beautiful early verdure : it affects a dry rather than a moist situation ; and hence it keeps its verdure in long-continued dry weather better than most others ; but it will thrive in either : it should be cautiously avoided, however, in lands not intended to be permanently in grass, as its roots creep like those of couch-grass ; and therefore not easily extirpated : it never throws up any flowering stems or bents, but once in a season (May) ; from this peculiarity, joined to its hardiness and verdure, it would appear to be a good grass for *lawns* or *grass-plats*."

2. "*Agrostis capillaris* (fine bent-grass)—whole acres of it on downs, sheep-walks, &c. : it is of ready growth, bears the scythe well, is of fine foliage, and

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\* Curtis.

resists drought better than most : if any of the bents deserve culture, it is this\* ; and for *luxens* or *grass-plats*, it seems likely to be the best of all our English species."

3. "The *Agrostis fascicularis* is of still finer foliage than the latter ; and would probably succeed better, for the same purposes, on moist soils."

4. "*Festuca ovina* (sheep's fescue-grass) appears to us to be applicable only to the purpose of making a fine-leaved *grass-plat*, that shall require little or no mowing. For this purpose, it must be sown about the middle of August, in an open, not too dry, situation, thickly, on ground very nicely prepared and levelled : when it has once got possession of the soil, it will form so thick a turf, as to suffer few intruding weeds, and may be kept in order with little trouble."

2. Laying down land to grass *without seeds* :—In former times, this was the general practice. A few corn crops were taken in succession ; and manure was always given with the last crop, to be laid down "in good heart." No stock was to trample the new land in winter : rolling was used in spring, where necessary ; and a light top-dressing was occasionally administered. Such lands were grazed the first summer, and either mowed or grazed the second year. The finest and best old pastures of the present day, were probably laid down in this manner. Such modes of tillage were sometimes adopted as encouraged most the growth of natural grasses : such crops as required but one ploughing were preferred ; hence oats was a more favourite lay-down crop than barley. Long-lace ploughing of ley

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\* "I do not think so."—*Dr. Richardson*.

grounds

grounds (*carreio tir\**), and partial paring with a broad mattock for burning (*ceibio brãh*), were sometimes resorted to; that the roots of the former natural grasses might be partially preserved against the laying down again to grass. These practices are not yet entirely discontinued in the more sequestered parts of the country.

*On the natural tendency of the Soil to Grass.*

“ The arable land, left unploughed, is soon covered with natural grass; but under the present system this is never permitted; and when the land is laid down to grass, it is generally sown with seeds.”— *Radnorshire*.

“ The limestone soil of the Valley of *Taf fawr* is remarkably favourable to the production of trefoils. Sow barley this year, and leave it to rest the next, the *meillionen* or white clover abounds so much, that it may be mowed with profit; but the influx of mouths to Merthyr Tudful caused the plough to be constantly

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\* *Long-lacing* is, to plough stripes of about eight furrows wide, leaving about half a perch between each stripe: on every stripe or lace, lime is spread, and the sides turned over it; or the lime laid in small heaps, and the earth put over them with shovels, and so left till the lime is slaked; then spread over the lace, and the whole harrowed, or first ploughed and afterwards harrowed: after this it is spread over the green or unploughed part, leaving a proportionate quantity on the lace or stripe. If rain occurs soon after this, the grass will grow luxuriantly on the unbroken parts, and hay sometimes mowed thereon; but most commonly they graze it. In October they plough the whole, turning each side to the middle of the stripe, and sow wheat. By this method, much of that grass, that in an entire fallow would be lost, is saved. The quantity of lime in this management is about 200 bushels per acre. It is an ancient practice, and many are partial to it, even of those who are not obstinately prejudiced in favour of old usages.”— *E. W.*



at work, to counteract the inclination of nature."—*The. Jones, Esq. in Brecknockshire.*

"A pretty general idea prevails in favour of laying down in natural grass; and consequently many do not lay down in clover or any other grass-seeds. Indeed the good and middling soils of South Wales return more rapidly to their natural grass, than those of the eastern and midland English counties, owing to the greater humidity of the western coast climature; so that by the old farmers, clover is only an intermediate or ameliorating crop, preparatory for wheat."—*E. W. in Glamorganshire.*

"On the good soil of Llaugharne Marsh, the land is commonly left to lie in barley-stubble, without any grass-seeds; and it recovers its sward, and produces good crops of hay and grass.

"All the strong loams of this county produce good grass, when laid down in proper condition. Every Caermarthenshire farmer knows, that if he manures and ploughs his land well, and afterwards forbears to run it out of condition by too many corn crops, it will become good grass-land.

"In dry loamy soils, artificial grasses may be sown with success, on lands intended to be laid down for pasture or meadow; but I doubt whether the *natural grasses* of the Vales may not be preferable to any other sorts."—*Mr. Hussall, in Caermarthenshire.*

"The mildness of the climate, the moisture of the atmosphere, the very little frost to which the country is subject, and the perpetual vegetation which is uniformly going on, even in the winter months, seem to point out this tract in so peculiar a manner favourable to grass, that one cannot but lament to see so much of it under the plough.

"Indeed,

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“Indeed, such are the vegetative powers of the soil, that after it has been so much exhausted by excessive tillage, if left to itself, untouched by the plough, it will exhibit early signs of returning vegetation; and in the course of a few years will recover its natural fertility: and where such land has been judiciously cropped, cleared of the couch-grass and other weeds, which repeated bad husbandry had introduced, and then laid down in tolerable heart, the progress of improvement to pasture and meadow has been unusually rapid.”—*Mr. Hassall, in Pembrokeshire.*

“We are under the necessity of liming profusely; and thereby endeavouring to check the superabundance of natural grasses in our corn crops.”—*Vales of Towy and Glamorgan.*

“Our climate is much moister than that of the eastern and other parts of the kingdom; and consequently our soils are more inclined to run into grass: but our climate is somewhat drier; and our lands, when well managed, are easier kept clean than those of the neighbouring counties of Caermarthen and Pembroke.”—*Cardiganshire.*

Having thus far treated of the natural tendency of the soil to run into grass, we come next to reflect upon the issue of trusting to this spontaneous produce. Were all the lands, naturally fertile, well tilled, cleaned, manured, and not over exhausted by cropping, we would not be disappointed in a good pasturage of natural grass the first year, and a good crop of hay the second year: but too little distinction is made, too commonly, between the powers of vegetation in vale lands and uplands; and both are too frequently laid down, when the last crop of corn has to struggle for its existence with too numerous a party of hardy and strong-

strong-rooted weeds; from the appearance of which, after harvest, one may easily guess at the quality and quantity of the succeeding crop of natural grass. "Upon light upland soil, during the first six or eight years, it produces nothing at all, a few miserable bents and feeble weeds excepted. In some parts of the district, it is no uncommon thing to see more than half the surface of a good farm in this deplorable state."—*Mr. Hassall.*

"No farmer should lay down land for a natural sward: I never saw good grass by that means the first year. Sweet land, after close feeding, may turn out good sweet grass in four or five years."—*Mr. Gale.*

Upon the whole, let the soil be ever so well managed, it appears to us, that a few pounds per acre of the most approved seeds, would pay the farmer exceedingly well for the few first years, until the natural grasses will have so far established themselves as to produce a good crop.

We took our informations without *affidavits*, in the legal sense of the term; and among others, the following, in the Vale of Glamorgan:

"An old pasture was broken up, and wheat sown; an abundant crop ensued. The stubble was burnt, a bastard fallow made, with from 20 to 25 cranhooks of lime per acre: wheat again, an excellent crop. The third year there was in readiness the mud of a large pond that had not been emptied for many years, and made into lime compost: this was given to the field at the rate of 50 or 60 cart-loads (of two cranhooks, or 18 bushels) per acre; and wheat again was sown: such a crop was never seen. Fourth year oats, and laid down for natural grass: kept up all the winter; and *two tons per acre of hay* mown from it the following summer.



Mowing it the first year was confessed to be bad management; but the field is now much more fertile than ever it was before it was broken up."

One time we took the opportunity of measuring a stack of hay of the second year's growth, near Flimston, in the Vale of Glamorgan. The piece was 12 acres; under barley in 1809; then left to sward, and grazed in 1810; kept for hay, after spring-grazing with ewes and lambs, mowed and stacked in 1811. The stack, made in the field, as customary, to fodder cattle therewith on the sward the following winter, was 27 feet in length, 15 feet in mean breadth, and 12 feet in mean depth; making 180 cubic yards; which at  $1\frac{1}{2}$  cwt. per yard, amounted to  $13\frac{1}{2}$  tons to pay from the 12 acres. One ton and a half per acre is said to be the average crop of the Flimston tract, on long-standing meadowlands.

By the hay in the stack, and the after-grass on the field in September, we were enabled to enumerate most of the grasses of which this second year's natural sward consisted.

Perennial red clover .....	<i>Trifolium pratense.</i>
White clover .....	<i>Trifolium repens.</i>
Bird's-foot clover .....	<i>Lotus corniculatus.</i>
Hop-clover .....	<i>Trifolium agrarium.</i>
Ribwort, or narrow-leaved plantain	<i>Plantago lanceolata.</i>
Meadow-vetchling .....	<i>Lathyrus pratensis.</i>
Smooth-stalked meadow-grass ....	<i>Poa pratensis.</i>
Cock's-foot grass .....	<i>Dactylis glomerata.</i>
Dog's-tail grass .....	<i>Cynosurus cristatus.</i>
Meadow soft-grass .....	<i>Holcus lanatus.</i>
Ray-grass .....	<i>Lolium perenne.</i>

*Inferior Sorts of Grasses, and Weeds.*

Crowfoot .....	<i>Ranunculus acris</i>
Rough dandelion .....	<i>Leontodon hispidum</i> .
Cinquefoil .....	<i>Potentilla reptans</i> .
Agrimony .....	<i>Agrimonia eupatoria</i> .
Knap-weed ( <i>pengaled</i> ) .....	<i>Centaurea nigra</i> .
Devil's-bit ( <i>y-bentus</i> ) .....	<i>Scabiosa succisa</i> .
Great plantain ( <i>Dail llydain y ffordd</i> )	<i>Plantago major</i> .
Rest-harrow ( <i>hwb yr ychen</i> ) ....	<i>Ononis arvensis</i> .
Eye-bright ( <i>red and white</i> ) ....	{ <i>Euphrasia odonites et officinalis</i> .
Wild carrot ( <i>moron gwylltion</i> ) ..	<i>Daucus carota</i> .
Common thistle .....	<i>Serratula arvensis</i> .
Dock ( <i>tafawl</i> ) .....	<i>Rumex</i> .
Couch-grass .....	{ <i>Triticum repens</i> .
	{ <i>Agrostis repens</i> .
Coltsfoot ( <i>Y Ddanol, Carn yr ebol</i> )	<i>Tussilago farfara</i> .
Stinking horehound .....	<i>Bulbosa</i> .
Wild tansey .....	<i>Potentilla anserina</i> .

In soils better managed, the weeds of course would have been less numerous; but the misfortune is, that the greater number of fields left for natural sward, are in a still worse state. Though some produce a portion of perennial trefoils and the best grasses the first year, yet, in others, we find only bents, crowfoot, coltsfoot, &c. We saw fields, where clover had failed, fully swarded the first year with bents (*agrostis fascicularis*), and *stolonifera*, and cat's-tail grass, (*phleum pratense*).

In the interior and eastern parts of the district, where the humid breezes of the Atlantic do not extend, and the soil is not quite so prompt, the laying down of land without grass-seeds is scarcely known, even by name; and in the southern and western parts, we are happy to find that the practice is declining apace; so that in



a few years more, there is a natural prospect, it will be recorded only as an exploded custom. In the mean time, let its warmest advocates give themselves fair play, by not exhausting the powers of the soil, nor crowding it with the vilest weeds, by over-cropping, before they lay it down "to rest;" and if, by such means, they can make it satisfactorily apparent, that laying down land, after a course of tillage, for natural sward, is more profitable to the manager, than laying down the same with clovers and other seeds, we shall rest willingly satisfied.

By laying down land with seeds, a farmer has his choice of sorts, whether clovers or proper grass-seeds; but by leaving the land for a natural sward, he must take his chance as to sorts. "Sweet land" in a moderate climature, will produce white clover, in part of the crop, the first year; but in exhausted soils, under different circumstances, it will not make its appearance so promptly; and when it does, the land will have been mostly occupied by hardy grasses of the more useless kinds for pasture, &c.; such as the *agrostis* tribe (*bents*), which are of late growth, and consequently of far less value than the earlier grasses, such as the vernal grass (*anthoxanthum*), foxtail-grass (*alopecurus pratensis*), smooth-stalked meadow-grass (*poa pratensis*), &c. These latter grasses would cover soils of moderate fertility early in May; whereas the bents, and other late grasses, the too common produce of natural swards, do not flower till July; and their herbage is comparatively far less palatable for stock.

On farms where the crop of hay is scarcely sufficient for the stock until they are turned out to grass, a crop of early spring feeding is of the greatest value. A farmer

farmer informed us, that one year his stock of hay had been entirely expended the first week in April. He had then a crop of very forward clover, which supported his whole stock, upwards of thirty head, until other pastures were ready: had this farmer not sown the clover, and trusted to natural sward, under the existing circumstances, his ruin would have been the consequence; as there was no hay to be had for money within many miles of the place. The clover-seed sown was from Holland, which is said to produce pasture about a fortnight earlier in spring than our own country seed.

END OF VOL. I.





















